GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified
HD Industrial Vacuum Hose for conducting abrasive dust or acid fumes
A
B
C
A Tough wear- and weather-resistant cover
B Reinforcement of sturdy wrapped fabric plus helix of flat steel wire prevents kinking and collapsing
C Smooth rubber tube resists attack of abrasive particles or corrosive fumes

Hose at one-third the cost outlasts pipe—4 to 1

Carrying off large quantities of abrasive dust had always been an expensive problem at this Northwestern plant. For it quickly ate through heavy-gauge pipe—especially where the ducts had to make sharp turns. In fact, 8 to 10 months was the limit for any pipe they tried.

But the G.T.M.—Goodyear Technical Man—figured he could top that with HD Industrial Vacuum Hose. It not only cost much less than the special pipe, but could be installed far more quickly and easily. And when worn, it could be rotated to distribute wear. But here's the real pay-off: at last report, *the G.T.M.'s hose was still going strong after 3 years' service.*

What about production-line problems swelling *your* costs – and eating *your* profits? You can't lose by turning the G.T.M. loose on them – whenever they involve industrial rubber problems. You can reach him through your Goodyear Distributor – or by writing:

Goodyear, Industrial Products Division,
Akron 16, Ohio

HD INDUSTRIAL VACUUM HOSE by

GOODYEAR

THE GREATEST NAME IN RUBBER

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

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Editorial Director

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Thermocouple Welding Technique

THE NAVY has developed a technique for attaching thermocouples to workpieces which facilitates the measurement of the temperature of the material.

Through this technique thermocouple wires are welded individually to the workpiece through discharge of a bank of charged capacitors. Weld characteristics are controlled by means of a potentiometer. The welder is portable and operates from a standard power supply.

The capacitance technique overcomes a number of problems encountered in the measurement of workpiece temperatures, such as the errors introduced by inertia of the thermocouple bead during rapid heating and cooling. It provides better thermal contact than mechanical methods.

This method is described in the report PB 121901, Attaching Thermocouples by Capacitance Welding, U. S. Naval Gun Factory, April 1955. The report may be ordered from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C. It contains eight pages and the price is 50 cents.

Russia Through an Editor's Eye

DICK MORRIS, Editorial Director of PLANT ENGINEERING, and his associate, Andy Kramer, Editor of *Power Engineering*, recently spent six months in Europe. They attended many international engineering meetings and Dick was the official AIPE delegate at three of these meetings—in England, Germany and Austria. The six months included one month in Russia and another month about equally divided between Czechoslovakia, Poland and Yugoslavia.

While in Russia, Dick visited some 20 plants and as many institutes, ministries and publishing activities. Since returning, he has shown his Kodachrome slides and talked on "Russia—An Engineer's Observations" to 35 groups, universities or institutes. These included: nine AIPE Chapters—Milwaukee, Pittsburgh, New Jersey, Union-Middlesex, Philadelphia, Montreal, New York, Los Angeles and Cleveland.

Dick Morris relates experiences during recent trip to Russia at annual meeting of Association of American Railroads

He has also presented the talk to the Engineering Faculty at UCLA, the honorium for which he donated to the AIPE Student Aid Fund, and the annual meeting of the Association of the American Railroads in Chicago. Carl Elber, Secretary of the Division, advised Dick Morris of the following resolution which they adopted unanimously:

"Be it resolved: That the Electrical Section, Engineering and Mechanical Divisions, Association of American Railroads, in annual meeting assembled, record its gratitude and appreciation to Mr. Richard H. Morris, Editorial Director, PLANT ENGINEERING, for his interesting and informative talk on the USSR."

Workshops, Shows, Conferences

FIFTH SEMI-ANNUAL session of the Plant Layout Technical Workshop will be held at the Greater Pittsburgh Airport Hotel from October 14 through the 18. Complete details and registration blanks are available from Homer H. Dasey, Plant Layout Technical Workshop, Box 233, Oakmont (Allegheny County), Pa.

National Safety Congress and Exposition will hold their 45th annual meeting from October 21 through the 25 in Chicago, Illinois. Sessions on industrial safety are scheduled for the Conrad Hilton, Congress, Morrison and LaSalle hotels. Other sessions on

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The Power Plant Engineer Said:

"I WOULDN'T KNOW..."

INQUIRING REPORTER: So you use Nalco System water treatment ... How often are your boilers turbined?

ENGINEER: I wouldn't know—only worked here seven years.*

* You recognize the Engineer's answer as a twist on the old one about *How-often-do-you-get-a-raise-around-here.* Our excuse for bringing it up is that the engineer's answer applies to hundreds of plants using Nalco water treatment. New plants, starting boilers from scratch with Nalco, report years on line, *billions* of pounds of steam generated in boilers that have *never* been turbined ... and probably never will be. Older plants, where turbining was as routine as checking the draft gauges, now open boilers only to show the inspectors.

These Nalco *results* can quite possibly be duplicated in your plant, regardless of the kind or severity of your water treatment problems ... or the size of your operation. Write or phone, now, for a fast start toward permanent water treatment security.

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Specify

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FLEXIBLE COUPLINGS

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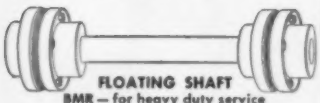
DBZ — for high speed, heavy duty drives



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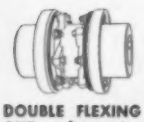
BMR — for heavy duty service with excessive misalignment



DOUBLE FLEXING
AMR — for engine and medium speed drives

SINGLE FLEXING
SS — for engine-driven generator sets with out-board bearings

Thomas' 40 years of flexible coupling experience is at your disposal to help you meet ordinary applications or special variations for unusual cases.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
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8 No Maintenance

Write for Engineering Catalog 51-A

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA, U. S. A.

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'ROUND ABOUT

traffic safety, commercial vehicle and transit safety, farm safety, school safety and home safety will be held at various Chicago hotels. Further information may be obtained from R. L. Forney, National Safety Council, 425 N. Michigan Ave., Chicago 11, Illinois.

The 21st Annual National Time and Motion Study and Management Clinic will be held on October 30, 31 and November 1 at the Sherman Hotel, Chicago. Topflight experts will discuss the latest developments in work simplification, job evaluation, production control, plant layout, materials handling and human relations. Inquiries should be addressed to the Industrial Management Society, 330 S. Wells St., Chicago 6, Illinois.

Drafting Seminars

SEVERAL HUNDRED key engineers, designers and draftsmen will learn how to cut costs and increase engineering output at two one-day seminars on Advanced Drafting Techniques and a seminar on Simplified Drafting Practices.

The seminars on Advanced Drafting Techniques will be held in Cleveland on September 24 and in New York on October 2. Seminars will be conducted by a panel of experts from Westinghouse Electric Corp. They will demonstrate many cost-reducing techniques which have been developed by Westinghouse and are now being applied and taught throughout the company's engineering operations.

The Simplified Drafting Practices seminar will be held in Chicago on September 18, and will present a comprehensive round-up of all the latest developments in the field. It will be conducted by Don Fuller of the H. K. Ferguson Co. and will demonstrate the techniques that have become standardized throughout the world-wide operations of the company.

Further information and reservations on these three seminars can be obtained from Industrial Education Institute, 25 Huntington Ave., Boston 16, Massachusetts.

Master Mechanic Aradan

GEORGE S. ARADAN was recently named divisional master mechanic of Chrysler Corporation's Stamping Division, Detroit, Michigan.

He will direct the division's tool and die engineering, tool and die construction and engineering analysis and process development. He will also be responsible for the coordination of plant master mechanic activities in all stamping division plants.

Mr. Aradan was born and educated in Detroit. His career in the automotive industry began in 1934, and he joined Chrysler in 1953.

Scoop Visits New Automatic Tube Mill in Canada

Mannesmann A. G. of Germany recently opened a new seamless tube mill in Saulte Ste. Marie, Ontario. The mill is equipped for a high degree of automatic operation. A maintenance feature of the Mannessmann Tube Co., Ltd., facilities is the fast replacement of entire roll stands. Among visitors from abroad, Canada and the U. S. was Scoop Skubik (arrow) Associate Editor, Plant Engineering

*Snap-Tite

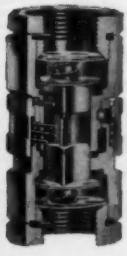
QUICK-CONNECT
QUICK-DISCONNECT COUPLINGS

in larger sizes

immediate delivery
FROM FACTORY STOCKS

SNAP-TITE'S "H" COUPLING, SIZE FOR SIZE, IS THE SMALLEST COUPLING WITH HIGHEST STRENGTH AND HIGHER EFFICIENCY

Snap-Tite's "H" Couplings are now factory-stocked for quick shipment to you, not only in the smaller sizes (below 1" ID) but in all sizes up to and including 3"—in steel, brass, aluminum, and 303 and 316 Stainless Steel. And "H" Couplings can be made to your order, up to 10" ID.



Available with valves to give two-way or one-way automatic line shut-off, or without valves for straight-thru flow, "H" Couplings are built to handle high pressures in hydraulic and air systems.

Recessed valve washers . . . fluted valve stems . . . valve stops with minimum flow restrictions . . . large inside diameter—allow maximum flow capacity with lowest pressure drop.

See the Snap-Tite representative in your city or write for Bulletin 240.

*Snap-Tite, INC.

UNION CITY 5, PENNSYLVANIA

SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

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Kimwipes*

INDUSTRIAL WIPERS

wipe clean

won't

Kimwipes are made by the makers of Kleenex* tissues

cost less than cloth!

faster!

scratch!

You save money. Kimwipes cost less than cloth to start with—*and* you eliminate laundry bills, time-wasting rag collecting and losses due to pilferage.

You save workers' time. Soft, absorbent Kimwipes are disposable. Workers use a clean, fresh wiper every time—a clean wipe is a fast wipe.

You save production costs. With Kimwipes there's no hold-over of grit or metal filings to scratch critical surfaces. You eliminate rejects.

New Kimwipes Dispenser

Holds the new, economical Dispenser Pack of 200 Kimwipes. Keeps work areas clear—puts wipers within time-saving reach. Ask your supplier or write to Kimberly-Clark, Dept. **PE-97**, Neenah, Wisconsin.

Kimberly-Clark Corporation Neenah, Wisconsin

*T. M. Reg. U. S. Pat. Off.

Actual photograph of control center bus structure being tested under bolted fault conditions with test oscillograms superimposed.

New Westinghouse Control Center

Tested at 25,000 amperes with no injury to bus

At the Westinghouse high power laboratory, control center safety features are tested under maximum fault conditions to prove dependability of new design

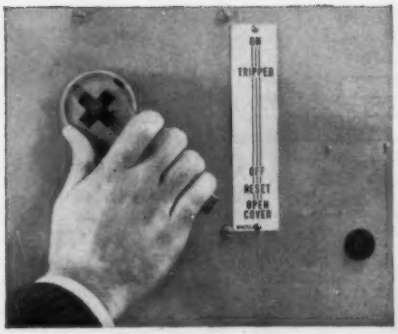
Safety Features incorporated into the design of the New Westinghouse Control Center fully protect both personnel and equipment. Extensive tests in the Westinghouse High Power Laboratory, including maximum fault conditions, conclusively prove these features make the Westinghouse unit industry's safest control center.

With complete interchangeability between 9⅛ and 14 inch modular units, simplified installation, and increased safety, Westinghouse Control Centers make possible the most compact, economical centralized control system.

For complete information on the Westinghouse Control Center, call your Westinghouse sales engineer, or write Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa. J-22060

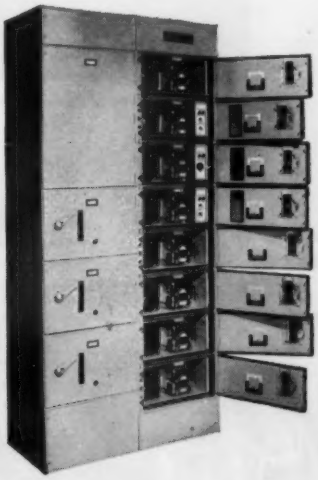
YOU CAN BE SURE... IF IT'S

Westinghouse



DOOR HANDLE SHOWS BREAKER POSITION with no guesswork. Breaker must always be in "off" position before door can be opened, eliminating any chance of personnel touching a "live" unit.

GUIDE RAILS PROVIDE FOOLPROOF ALIGNMENT of stabs. No need to juggle unit into position, no chance of shorting bus with unit. Guide rails support unit and insure positive alignment of stabs.



ROLLED DOOR EDGES WITH NEOPRENE GASKETING provides protection for components against dust, moisture, fire or contaminants. The complete control center is safer . . . less subject to atmospheric damage.

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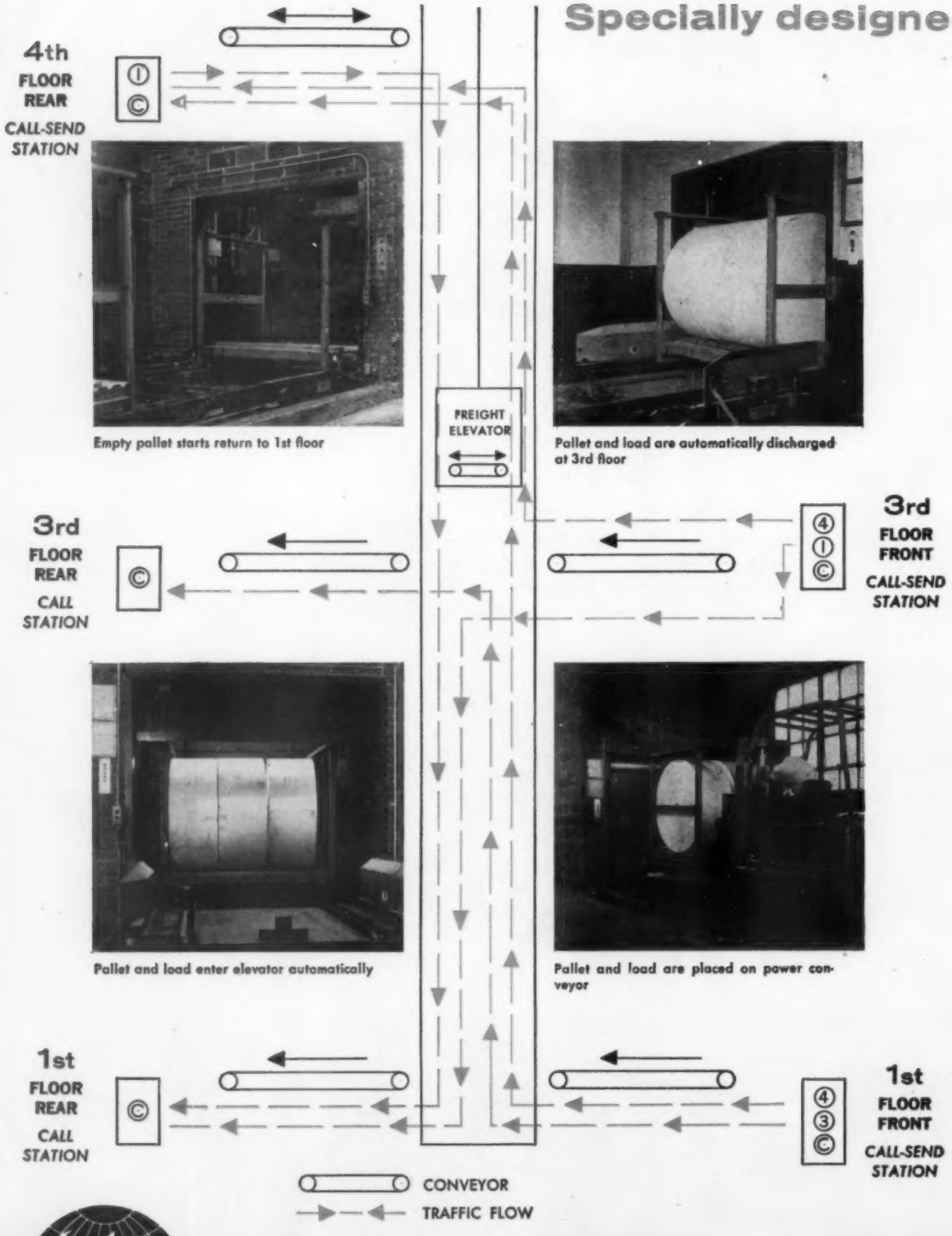
Specially designed



Otis **freight elevator**

"ENGINEERED SERVICE BY THE MAKER"

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N. Y.

'Call-and-Send' system handles multi-floor freight automatically

OTIS and the Alvey Conveyor Company developed the special materials handling system illustrated and explained at the left. Power-operated conveyors serve as the elevator platform and the floor landings. Light-ray devices coordinate freight movement and elevator door operation.

This 'Call-and-Send' system was developed for the INDIVIDUAL DRINKING CUP COMPANY, a subsidiary of Dixie Cup Company in Easton, Penna.

OTIS is very much interested in helping to develop automatic materials handling systems.

Further, OTIS is able to assure the uninterrupted operation of these systems by providing OTIS Maintenance. The elevators in the 'Call-and-Send' system, five other freight elevators and one passenger elevator, all by OTIS, have been under OTIS Maintenance for a total of 60 years and are still operating at their original efficiency. The life of these elevators is being constantly extended indefinitely by checking and replacing all wearing parts in advance of their breakdown point. This prevents production losses. With OTIS Maintenance there's just one fixed monthly charge. This prevents unexpected, expensive repair bills.Basically OTIS Maintenance is designed to keep elevators running like new on a fixed budget basis.

Only Otis Maintenance offers these advantages to owners of Otis Freight Elevators

- ☑ **"Engineered Service" by the maker maintains the original efficiency of the installation and assures peak performance at all times.**
- ☑ **Services of factory-and-field trained men with a knowledge of elevatoring that can't be matched.**
- ☑ **Availability of original or improved replacement parts for every installation, regardless of its age.**
- ☑ **Freedom from unexpected, expensive repair bills. There's just one fixed monthly charge. It can be budgeted. It's adjusted annually, up or down, on labor and material costs only. Never because of the age or condition of the equipment.**
- ☑ **Guarantee of the maker's high standards of safety through the constant checking and replacing of parts in advance of their breakdown point.**
- ☑ **Elimination of all guesswork in testing and repairing by using specially designed tools and electronic equipment to minimize shutdowns.**
- ☑ **Systematic upkeep and replacement of parts extends the life of an installation indefinitely.**
- ☑ **The value of a maker's pride. A perfectly performing Otis installation is Otis' best salesman. That's why we're never satisfied with anything less than peak performance at all times.**

Baker Trucks with a paper-roll grab on a 360° revolving head can pick up, carry and stack rolls in any position.

Baker®
industrial trucks

The Baker-Raulang Company, an Otis subsidiary, is the maker of Baker Gas and Electric Industrial Trucks.

maintenance
that keeps freight elevators running like new

OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

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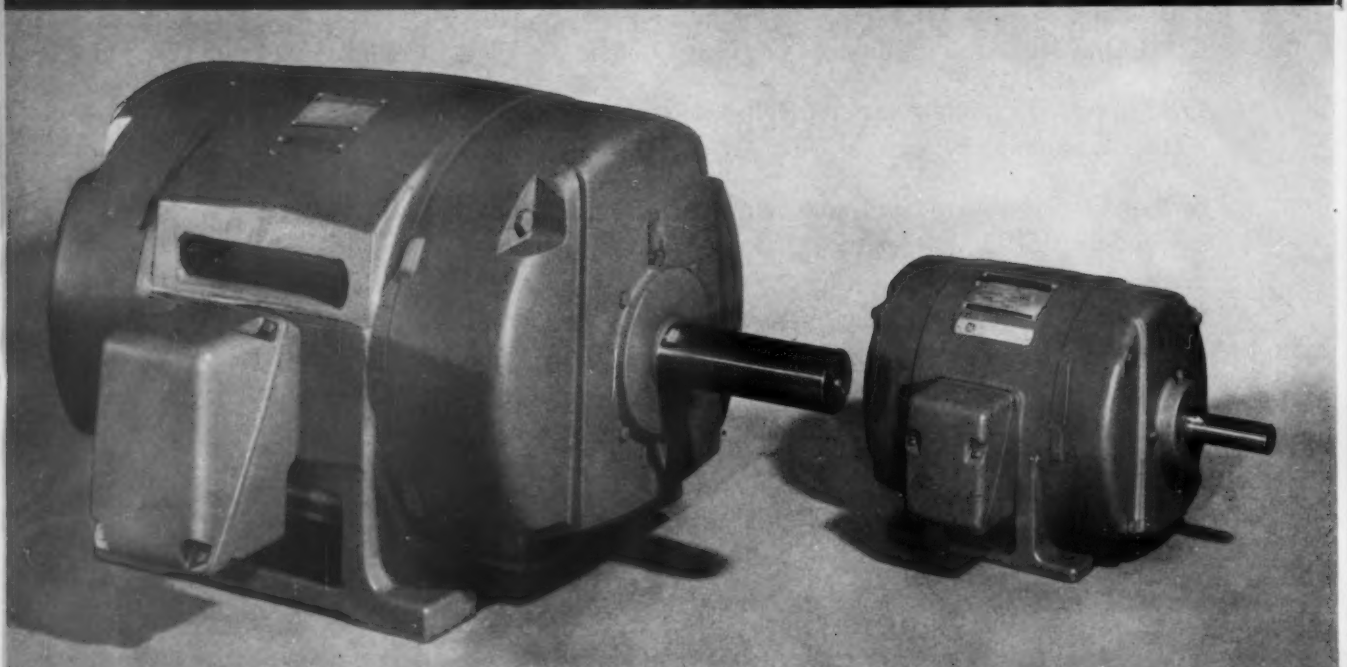
immediate shipment . . . all ratings

General Electric TRI 55 CLAD

REG. U.S. PAT. OFF.

NOW UP

DRIPPROOF



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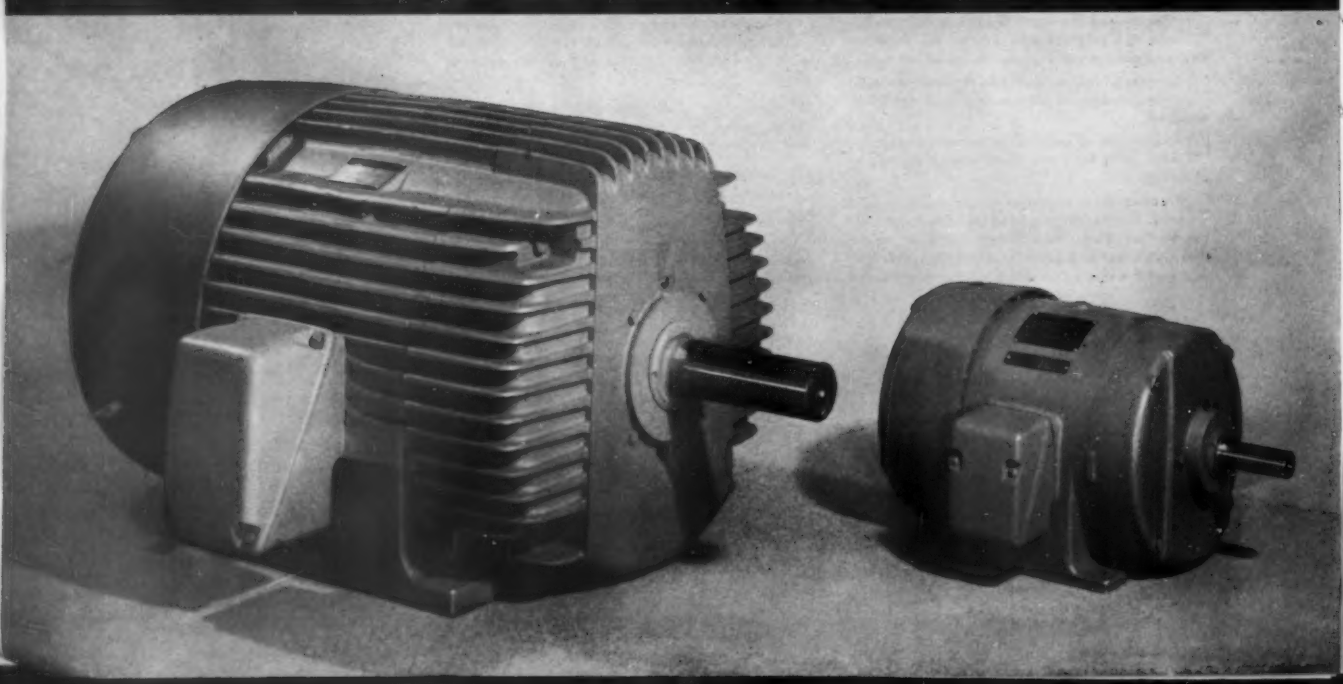
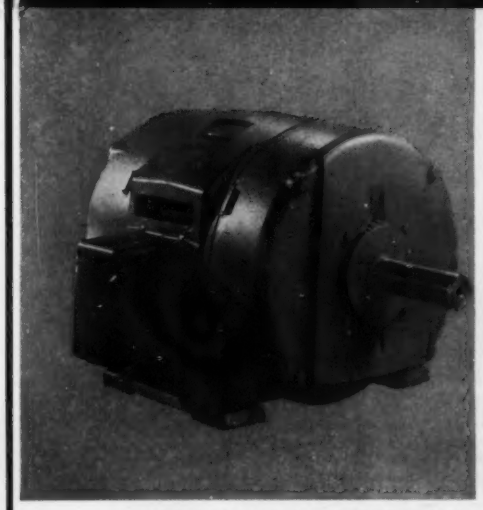


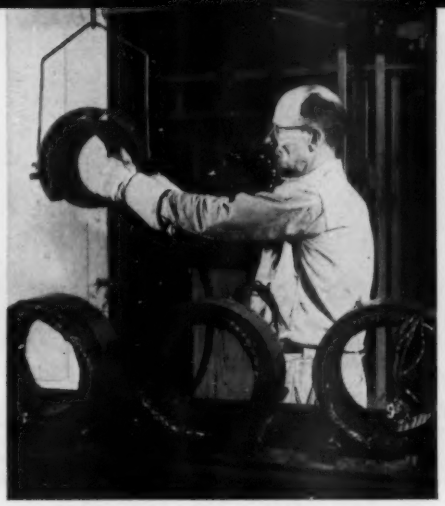
Motors in New NEMA Ratings

TO 125 HP

YEARS AHEAD BENEFITS

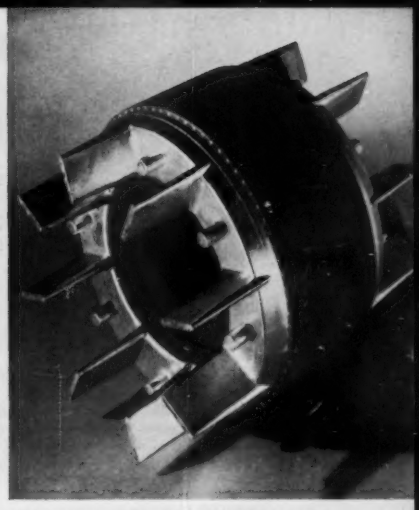


DESIGNED FOR GREATER PROTECTION—Better protected against physical damage by rugged cast-iron frame and endshields, new Tri-Clad '55' motors will handle many applications where ordinary dripproof motors cannot be applied.



BUILT TO PROVIDE LONGER LIFE—Longer stator life is provided through use of new, advanced insulation system utilizing Mylar* slot insulation, Formex® magnet wire, non-wicking Geoprene® leads and Dri-Film® silicone coating.

*Registered DuPont Co. Trade-mark.



ENGINEERED FOR TOP PERFORMANCE—Improved rotor is solid cast from commercially pure aluminum for greater strength, higher conductivity. Integrally cast rotor fans conduct heat to air stream more effectively than separately joined fans.

FOR COMPLETE INFORMATION

FOR COMPLETE DETAILS on the new line of Tri-Clad '55' motors up to 125 hp, contact your local G-E motor distributor or the sales engineer at your nearby General Electric Apparatus Sales Office. You will get expert assistance in selecting and applying the right motor for your particular application.

FOR FREE SLIDE RULE—which lets you determine at a glance the weight and space-saving benefits of recently announced NEMA standards for larger motors—and for informative, free General Electric Tri-Clad '55' motor bulletin, please send attached coupon.

Section 891-6
GENERAL ELECTRIC COMPANY
Schenectady 5, New York

Please send me the following publications:

☐ **FREE BULLETIN** (GEA-6602) describing the many advanced features of new Tri-Clad '55' motors up to 125 hp.

☐ **FREE SLIDE RULE** (GEN-148) to determine weight and space-saving benefits of new Tri-Clad '55' motors.

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Progress Is Our Most Important Product

GENERAL ELECTRIC

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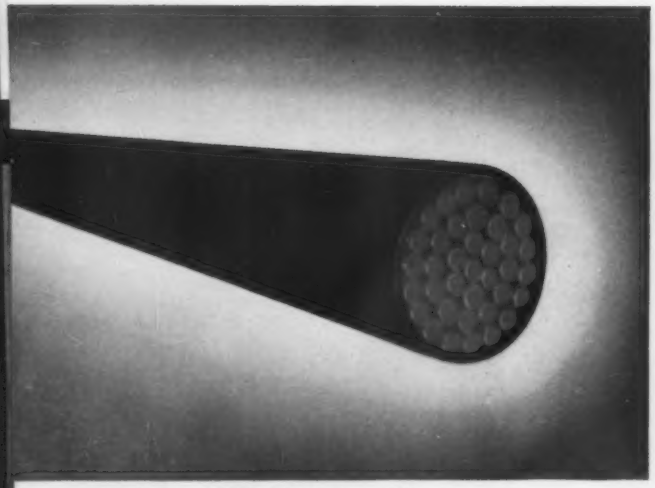
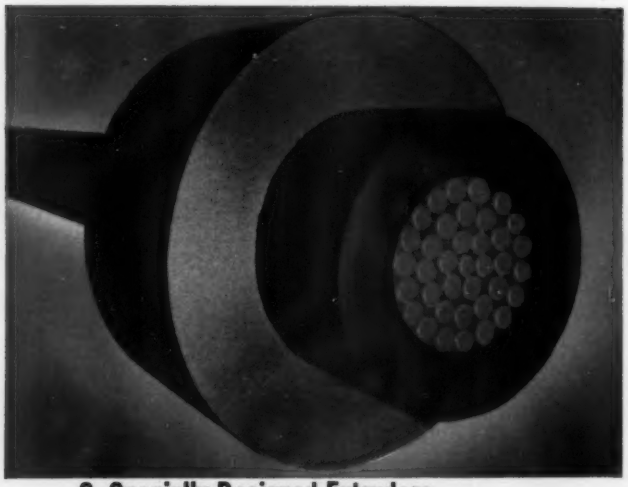
How the Nepco Process makes Butyl better



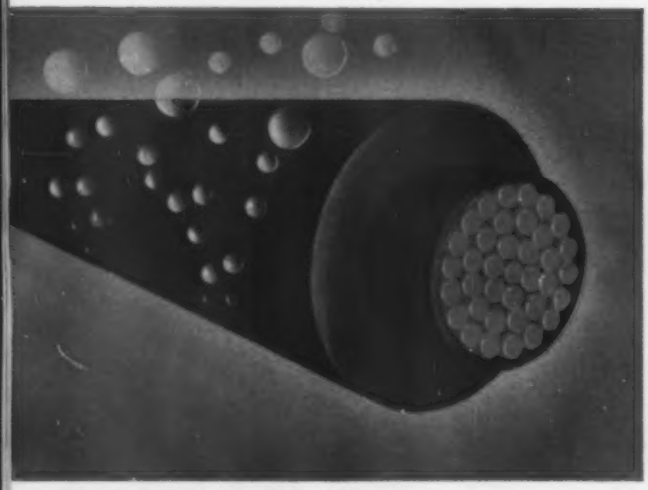
1. Vacuum Chamber Core Cleaning

All cores or copper stranding which in high voltage applications is normally wrapped in a special semi-conducting impregnated tape is passed through a high vacuum chamber to "boil-off" absorbed gases and moisture from the core.



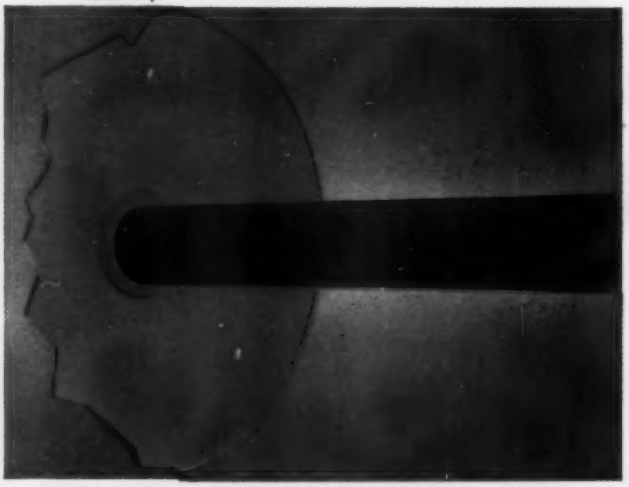
2. Specially Designed Extruders

After investigation, NE selected extrusion as the best method of applying a reliable dense, uniform insulation without troublesome interfaces. Since standard extruders were erratic in their capacity to process Butyl rubber, NE installed new equipment specifically designed to slowly work Butyl rubber at its optimum consistency.



5. Fugitive Vulcanizing Agents

Vulcanizing agents that leave the by-products of the vulcanizing action in the insulation reduce cable service life and electrical stability. NE has developed fugitive vulcanizing agents with volatile decomposition by-products that can be eliminated from the cable construction.



6. Pressure Vessel Vulcanization

NE Butyl is continuously vulcanized at over 400 degrees in a specially designed 200 foot pressure vessel . . . long enough to permit thorough saturation of the reactive centers and to allow the Butyl to interbond with the semi-conducting strand shielding tape to form a continuous mass.

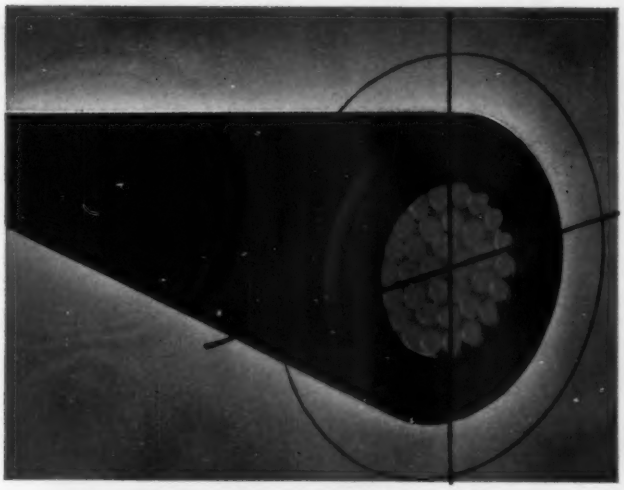
don't say <u>any</u> wire

Butyl rubber has inherent characteristics that make it an ideal insulating material for high temperature, high voltage wire and cable. It has outstanding resistance to heat, ozone and moisture.

To take full advantage of these characteristics requires special know-how and special equipment on the part of the wire and cable manufacturer. Here are eight things which National Electric does to get the best out of Butyl rubber and make NE Butyl insulated wire and cable the most dependable on the market.

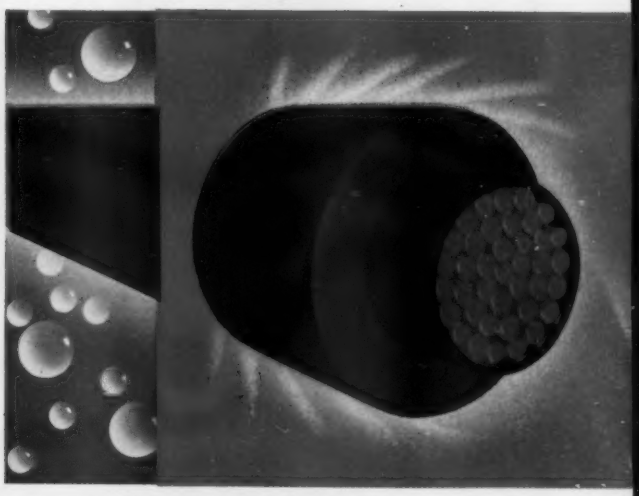
National Electric Products

Pittsburgh, Pa.: 2 Plants • 12 Warehouses • 41 Sales Offices



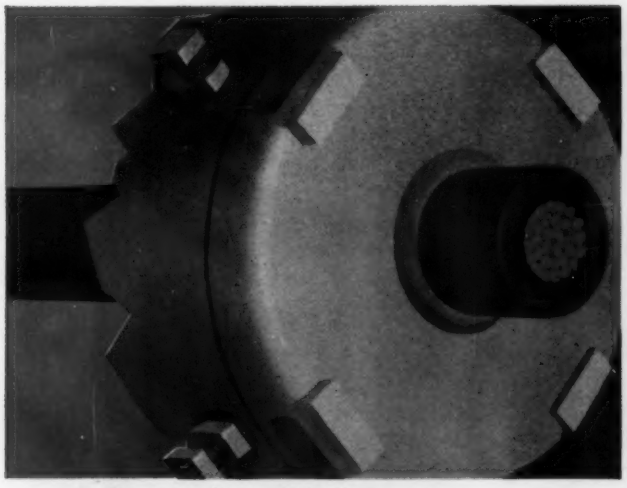
3. Controlled Concentricity

Every foot of cable is checked by a special monitoring station to maintain a perfectly centered core and uniform wall thickness before the material enters the vulcanizing chamber.



4. Water Cushion Processing

NE Butyl Rubber rides into the vulcanizing chamber through a high pressure water seal that molds the rubber uniformly onto the cable, impregnates the interstices of the shielding tape before vulcanization.



7. Pressure Vessel Cooling

Perhaps the most important part of the Nepco process. NE Butyl insulated cable is slowly cooled in a second pressure vessel under the same pressure at which it was vulcanized. This cooling under high pressure forces gaseous by-products out of the insulation . . . permits the use of volatile vulcanizing agents which leave no harmful residuals behind.

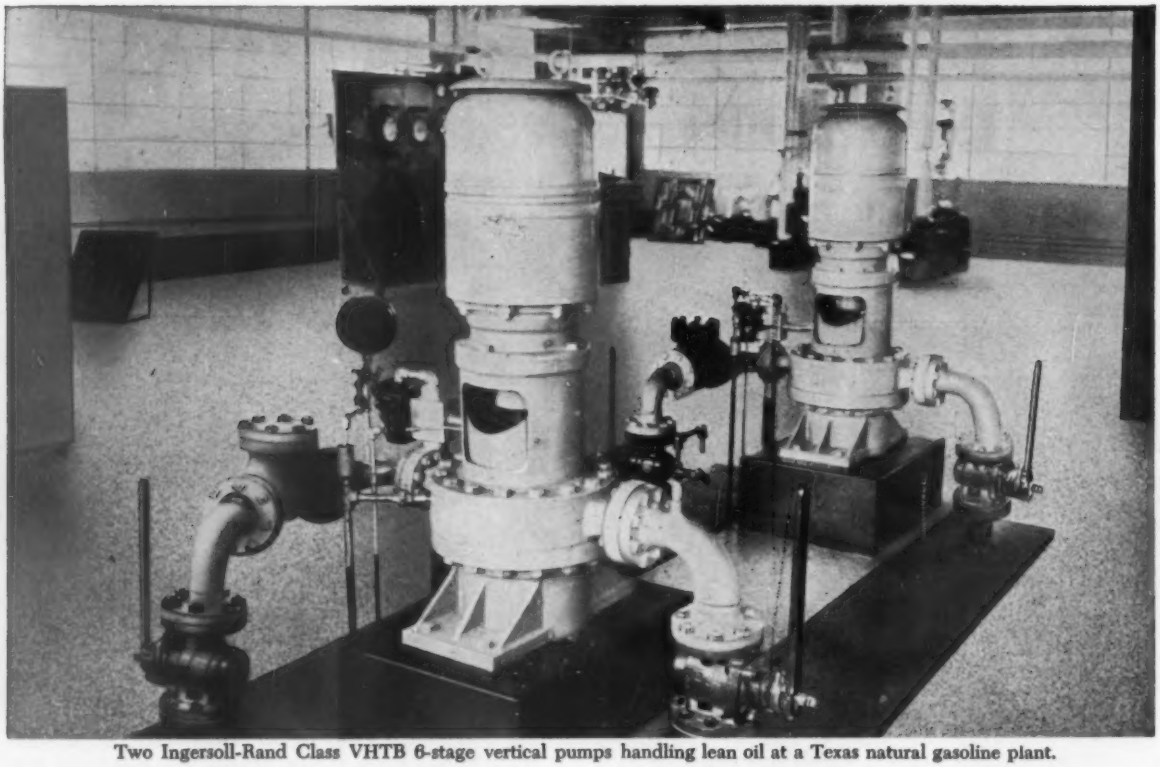
The inherent inertness of the Butyl rubber polymer permits the insulation to be compounded and vulcanized to a much tougher and mechanically stronger material.

A typical National Electric Butyl formulation has at least twice the tensile strength specified for an oil base insulation and will maintain this margin of superiority during long term accelerated service tests. That's why when you plan to install Butyl rubber insulated wire and cable . . . don't say *any* wire . . . say NE Wire.

. . . say NE wire

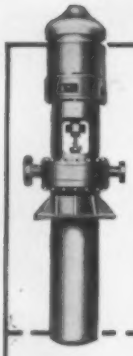
For more facts circle 510 on Reply Card

VERTICAL PUMPS



Two Ingersoll-Rand Class VHTB 6-stage vertical pumps handling lean oil at a Texas natural gasoline plant.

to lower your pumping costs



CLASS VHTB
Pressures: to 1500 psi
Capacities: 25 to 325 gpm
Temperatures: to 750°F.

Vertical, multi-stage diffusor-type unit. Single-suction impellers mounted back-to-back for axial hydraulic balance. Stuffing box under suction pressure.

For low capacities at high heads on process, boiler feed, hydraulic and similar applications.

CLASS VP
Pressures: to 750 psi
Capacities: 10 to 350 gpm
Temperatures: to 750°F.

Vertical, multi-stage, diffusor-type construction. Single-suction impellers with throttling sleeve balancing device to reduce axial thrust and provide suction pressure at stuffing box. Entire pumping element removable without disturbing suction and discharge piping.

For low capacities at medium high heads on applications such as process, boiler feed, and heater drain work.

Designed specifically for low-capacity high-head applications, these Ingersoll-Rand vertical process pumps are engineered with a background of process pump experience. They are manufactured in the most modern of pump plants to deliver years of efficient service with a minimum of down time and maintenance expense.

Features include: "Double-Case" construction with segmented diffusor-type inner casing for complete radial hydraulic balance and minimum bearing wear... Positive aligning feature for perfect positioning of inner casing segments... Rotor assembled without prestressing shaft to eliminate all possibility of shaft distortion. Available in bronze fitted, all iron, carbon steel, and stainless fitted materials to cover a wide range of process services.

Ask the Ingersoll-Rand engineer to show you these and other features which make Ingersoll-Rand pumps your best bet for low cost year-in, year-out service.

Ingersoll-Rand

10-376 **11 BROADWAY, NEW YORK 4, N.Y.**

COMPRESSORS • GAS & DIESEL ENGINES • AIR & ELECTRIC TOOLS • CONDENSERS • PUMPS • ROCK DRILLS • VACUUM EQUIPMENT

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IDLEWILD HANGAR: CLEAN, BRIGHT AND WEATHERPROOF WITH

AMSTERDAM ALUMINUM PAINT

Amsterdam Aluminum Paint, made by **Amsterdam Color Works, Inc.**, New York, protects this huge expanse of weather-exposed metal.

Ever notice the clean, spruce appearance of commercial airport facilities? They're usually painted with aluminum. The two just naturally go together. One good example is this big Idlewild maintenance hangar owned by the Port of New York Authority. Recently, it was coated inside and out with Amsterdam Aluminum Paint, made with ALCOA® Aluminum Pigment by Amsterdam Color Works, Inc.

Airport authorities know that weatherproof aluminum paint is the best protection for any exposed surface. More, its high reflectivity turns back the sun's heat, lowers inside temperatures. And when applied indoors, reflective aluminum makes everything brighter, more attractive.

With modest investment, your plant or building can look like new again, too. Ask your painting contractor today about the better aluminum paints made with ALCOA Aluminum Pigments. One coat hides any surface, gives weatherproof protection for years.

ALCOA does not make paint, but ALCOA Aluminum Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by your paint manufacturer to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for our two FREE booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* They contain valuable, up-to-date information on all types of aluminum paint and aluminum asphalt coatings. Use the coupon.

PIGMENTED WITH ALCOA ALUMINUM — ALUMINUM COMPANY OF AMERICA

Reflective aluminum paint on structural steel gives hangar interior a clean, well-kept look.

Aluminum Company of America, Paint Service Bureau
1790-J Alcoa Building, Pittsburgh 19, Pennsylvania

Please send me your FREE booklets:
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am interested in protecting _____

Name _____

Company _____

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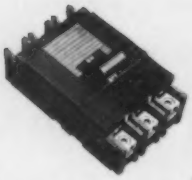
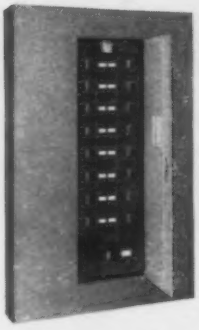
For more facts circle 512 on Reply Card

• Safety Switches and Industrial Circuit Breakers



• Fusible and Circuit Breaker Load Centers

• Voltage Testers

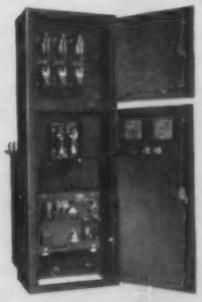


• Fusible and Circuit Breaker Lighting and Power Panelboards

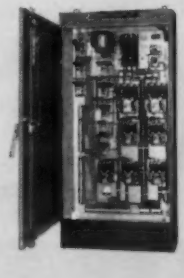
• Power Distribution Switchboards and Switchgear

Wherever Electricity

• Busways and Wireways



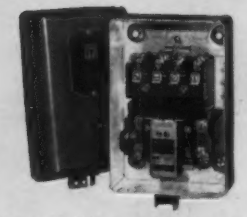
EC&M High Voltage and Synchronous Starters



• Special Purpose Control

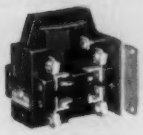
• Control Centers

SQUARE D COMPANY

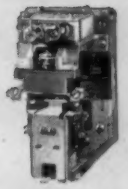


• A.C. Manual and Magnetic Starters

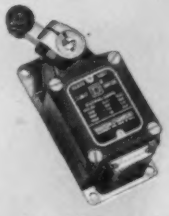
• Drum Switches



• Control Relays

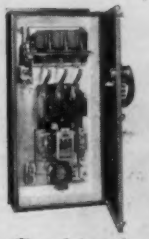


• Timing Relays

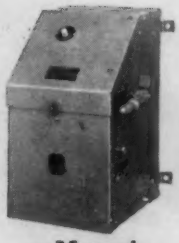


• Limit Switches

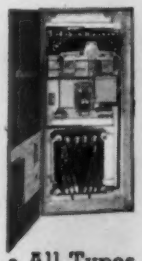
• Pushbuttons



• Combination Starters



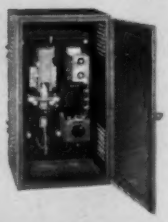
• Manual Compensators

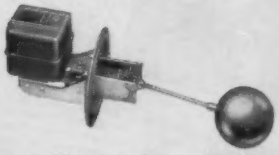


• All Types of Reduced Voltage Starters

• D.C. Starters

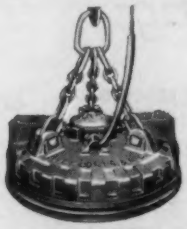
• Electronic and Electro-Magnetic Welder Control



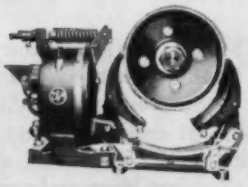


• Float & Pressure Controls for Pumps & Compressors

is Distributed and Controlled

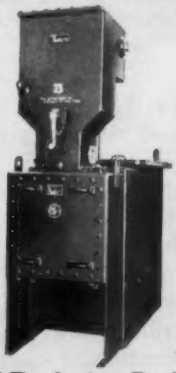


EC&M Lifting Magnets

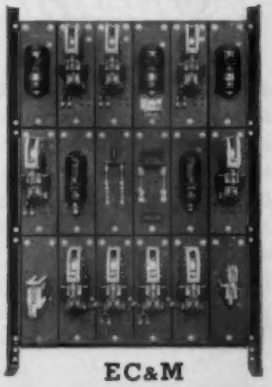


EC&M Magnetic Brakes

FIELD ENGINEERING SERVICE
available through Square D branch offices in all principal United States cities
... and in Canada, Mexico and England



EC&M Explosion-Resisting Control for Petroleum Industry



EC&M Crane and Mill Control

DESIGN LEADERSHIP FOR MORE THAN 50 YEARS

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process industries
Processors speed freight car handling with TRACKMOBILE
Trackmobile brings freight cars of fuel and raw materials into processing plants as they are needed, moves cars of finished product onto the siding as they are filled. Production is smoother inside with Trackmobile on the job outside. Road-to-rail convertible feature means Trackmobile is never bottled up.
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Whiting Cranes, such as this, simplify storage operations in the paper industry. Every crane is engineered to exact requirements of capacity, frequency of operation and area of coverage. Exclusive Whiting features assure long life, trouble-free operation.
Trambeam Overhead handling systems save money
Pulp and paper makers . . . load, drag and chemical processors reduce materials handling costs and increase plant safety by moving materials overhead on Trambeam. Handles any load up to 15 tons rapidly and efficiently.

See how Trackmobile streamlines freight car handling

SEND FOR THIS BOOKLET! Looking for increased manpower efficiency? "Working for Profit", the new pocket-size booklet, shows how Trackmobile moves freight cars *as they are needed* . . . eliminates jammed sidings . . . converts to road wheels to get around bottlenecks . . . pays off with as few as 3 car moves a day. Shown above is just one of several pages describing how Trackmobile works for many industries.

This booklet also shows how to speed materials handling with Whiting Cranes and Trambeam Overhead Handling Systems. In addition, it describes many other types of Whiting equipment. Here are 32 pages of profit-building ideas, indexed by type of industry for your convenience. Write for your copy. *Whiting Corporation, 15675 Lathrop Avenue, Harvey, Illinois.*

WHITING

TRACKMOBILE

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; FOUNDRY, RAILROAD AND CHEMICAL PROCESSING EQUIPMENT

For more facts circle 514 on Reply Card

BULLETINS just released and of immediate interest

VALVES, TRAPS, PIPING

101 Automatic Valves — Condensed Catalog P & H-57, 12-pp, features company's complete line of automatic valves, covering main uses, installation tips and construction features along with specification tables for each series. Cutaway view illustrates design features, and a table gives selection tips. A. W. Cash Valve Mfg. Corp.

102 Plumbing, Heating Valves — Bulletin PH58, 16 pp, explains valve requirements of plumbing and heating systems, tells how company's valves meet these requirements, and shows typical installations. Among valves described are air and vacuum radiator venting valves for steam and hot water systems, water mixers, relief valves, others. The Dole Valve Co.

103 Valves, Regulators — This 8-pp catalog covers pressure reducing and regulating, relief, back pressure and control valves; controllers, differential regulators; oil pumping units; governors; combination and temperature regulators. Provides a photo of each unit, with text giving its function, application, construction and range of sizes. Includes examples of complete control systems. A. W. Cash Co.

104 Control Valves — Bulletin HB-6, 8 pp, describes air-operated Saunders patent-type valves. Gives construction details and operating characteristics. Also includes sizing data and a listing of flow co-efficients. Conoflow Corp.

105 Steam Traps — Quik-Flex thermostatic steam traps for outdoor and non-freeze service are described in Bulletin 257. Itemizes typical uses for these traps. Specifications and capacities are given in tabular form, accompanied by dimensional drawings. A piping diagram shows recommended installation. The V. D. Anderson Co.

106 PVC Pipe, Fittings — Technical data and installation information on unplasticized polyvinyl chloride pipe are provided in this 24-pp booklet. Also gives specifications for threaded and socket types of PVC fittings, valves and flanges, of normal and high-impact material. Contains pressure-temperature charts, chemical resistance tables, support spacing formulas. Tube Turns Plastics, Inc.

107 Rigid PVC Pipe — Bulletin 557, 12-pp, describes both regular and high-impact corrosion-resistant rigid polyvinyl chloride pipe. Includes tables of pipe sizes available, specific chemical applications, physical properties, temperature factors for various working pressures, support spacing and thermal expansion. Flow charts, installation instructions, pipe characteristics and uses given. Alpha Plastics Inc.

108 Insulated Piping — Bulletin 57-1, 24 pp, on prefabricated insulated piping systems, shows typical uses for Hel-cor pipe units for underground or overhead pipe systems. Also describes Utilidor conduits for protection of underground utility services. Sample specifications are given, along with conduit sizing charts. RicwiL, Inc.

INSTRUMENTS, CONTROLS

109 Pressure Regulators — Six-pp Folder AD-2268 describes bronze regulators for pressure control of air or steam at up to 250 lb and 450 F. Includes tables for selecting proper size regulator, plus diagrams and tips for making better installations, and a table of dimensions. Crane Co.

110 For Process Control — Bulletin MSP-141 describes company's Ring Balance recorders, indicators and controllers. Arrow and caption treatment explain proprietary features incorporated in these instruments designed for precise measurement and control of process variables. Hagan Chemicals & Controls, Inc.

111 On Hot Water Controls — Bulletin P-31 is offered as an aid in selection and application of controls for high temperature hot water installations. Diagrams explain how pump controls, water feeders and relief valves are used in high temperature systems. McDonnell & Miller, Inc.

ELECTRICAL

112 Distribution Panelboards — Bulletin GEC-1253A describes construction features of Converti-Fuse panelboards, designed to distribute power from main feeders to power loads, to other distribution panelboards and lighting panelboards. General Electric Co.

113 Control Centers — Publication EL-174, 32 pp, describes company's Unitrol, a standardized motor control center. Feature's Unitrol's new concept of modular design, which presents a variety of motor control in a central structure. Generously illustrated with photos, charts and layout plans, it presents varied applications and engineering data for facilitated selection and planning. Cutler-Hammer, Inc.

114 Manual Motor Starters — Bulletin GEA-6358A, 8 pp, covers company's new small-size manual starters for fractional-and integral-horsepower motors up to 7½ hp. Includes new features, application and installation data, and a rating table for the new plug-in heaters. Illustrates available open and closed forms with dimensions for each. General Electric Co.

115 Starters, Contactors — Motor starters and contactors in Sizes 4, 5 and 6, 50 to 400 hp, are described in 12-pp Bulletin 14B8615. Discusses advantages offered and explains in detail the ACBO arc centering blowout incorporated. Units presented are applicable to many types of drives including pumps, crushers, blowers, fans, screens. Allis-Chalmers Mfg. Co.

116 Plug-In Busway — Bulletin GEA-6470, 18 pp, describes features and advantages of company's plug-in busway that permits a direct plug-in to the bus bars, even when the run is energized to feed lighting and power loads. Functions and applications are detailed, arrangement of components illustrated, and ratings, weights, dimensions and technical data included. General Electric Co.

117 Data on Solenoids — General information and technical data on solenoids for a wide variety of standard and special applications is featured in 12-pp Catalog 57-S5. Engineering specifications are included, as well as photos, dimensional diagrams and pull curves. Automatic Switch Co.

118 Electrical Connectors — Twelve-pp Bulletin S7 presents information on Sta-Kon pressure wire joints, terminals and connectors for wire sizes from No. 22 to 250 mcm. A chart for each type lists wire range, stud size, dimensions and quantity per "pocket-size package." A section also covers installation tools. The Thomas & Betts Co.

119 Electrical Fittings — Catalog 57, 36 pp, describes electrical fittings, cable racks and wiring specialties for utilities and industrial plants. Illustrates installation details and pictures more than 90 products, including newest additions to company's line. Includes current prices, information on sizes and types of fittings in various metals. The M. &. W. Electric Mfg. Co., Inc.

120 Plastic Wiring Ducts — Low cost plastic wiring ducts for fast electrical control panel wiring are featured in this illustrated folder. Design features are detailed and three methods of mounting described. Panduit Co.

On pages 277-278 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

121 Conductor Code Chart — Past and present code name designations for aluminum electrical conductor are brought together in this reference wall chart. Lists alphabetically 600 code names and specifies type and size of products. Adjacent tables provide more detailed information, including data on coverings, messengers, sizes and strandings. British and U. S. standard tables are included. Kaiser Aluminum & Chemical Sales, Inc.

PUMPS, PUMPING

122 Blowers and Pumps — Blowers, gas pumps and vacuum pumps are de-

BULLETINS

(Begins on page 21)

scribed and illustrated in 8-pp Bulletin S-59F. Text covers characteristics of operation, construction, and types of drive. Also provided are details on relief valves, timing gears and thrust bearing assembly. Standard blower dimensions are charted as are performance examples for low, medium and high pressure blowers in terms of hp, rpm and cfm capacity. Sutorbilt Corp.

123 Refinery Pumps — Component interchangeability is stressed in 12-pp Bulletin B-1605, illustrated in color. These pumps handle most all refining process liquids, including petroleum hydrocarbons, chemical solutions and water. They are described and illustrated and performance curves for all sizes are included. Peerless Pump Div., Food Machinery and Chemical Corp.

124 Water Jet Exhausters — Sixteen-pp Bulletin 4P describes single-nozzle and multi-nozzle water jet exhausters, water jet laboratory vacuum pumps, and barometric hydro-vac exhausters. Provides application, construction and operation information on each type and gives sizes and dimensions. Capacity curves and ratios, and water consumption tables are included, also tables showing pump priming capacities. Bulletin also shows exhausters designed for service with corrosive vapors. Schutte and Koerting Co.

MECHANICAL POWER TRANSMISSION

126 Power Transmission Machinery — Bulletin A-646A, 8 pp, contains data on company's power transmission machinery, including sheaves, sprockets, bushings, conveyor pulleys, couplings, speed reducers, clutches, bearings, take-ups, V-belts, collars, and steel transmission pulleys. One page is devoted to Flexidyne, a dry fluid drive and its advantages. Dodge Mfg. Co.

127 Transmission Products — Catalog 914, 88 pp, features company's transmission products and their uses in elevating and conveying machinery. Descriptive information with drawings and tables of dimensions covers shaft collars, couplings, clutches, pillow blocks, tape-ups wheel hubs, gears, holdbacks, chains and sprocket wheels. The Jeffrey Mfg. Co.

128 Chains, Sprockets — Catalog 757, 68 pp, on company's stock roller chains and sprockets, stresses advantages gained through use of roller chain and pictures some typical roller chain drives. Tells how to select a stock roller chain drive. Provides specifications, ratings, prices and engineering data required for ordering. Book is generously illustrated with photos, dimensional drawings. Diamond Chain Co., Inc.

129 Oilless Bearings — Catalog 240, 24 pp, includes specifications, sizes, and operating characteristics of standard conveyor roll bearings as well as self-sealing, free draining and conical bearings for use on belt, live roller, gravity roller and special conveyors. Non-contaminating and abrasion resistant screw conveyor hanger bearings are detailed in a section which includes installation and dimensional data. Tables on speed and load valves, tolerances, clearances and press fits included. Arguto Oilless Bearing Co.

131 Spherical Roller Bearing — Eight-pp Bulletin A668 describes design and operation advantages of company's Spher-Align pillow block with improved spherical roller bearing. Complete selection data and specifications are tabulated. Dodge Mfg. Corp.

LUBRICATION

133 On Tool Lubricants — How to select tool lubricants and grinding coolants is covered in this 12-pp booklet. Tells what good tool lubes do, how to select cutting compounds, effect of cutting speeds on lube selection. A section on grinding coolants shows how wheel form, area of contact and grit size affect coolant selection. Also explains how six compounds can cover most metal cutting and grinding situations. Van Straaten Chemical Co.

134 Versatile Grease — Brochure 6-206 covers properties and performance of a versatile silicone-based grease. While developed primarily for high-temperature, slow speed bearings, it is used for everything from worm-and-pinion sets to compressor engine injector valves, and from hold-down bolts to plastic extruder nozzles. Examples of these and other current applications are discussed. Dow Corning Corp.

135 Plug Valve Lubrication — Sixteen-pp Section 5A of Reference Book 39 gives lubricant recommendations for nearly 4000 service conditions for which lubricated plug valves can be used. Also shows lubricated plug valve accessories, fittings, automatic lubricators, lubricant guns. Tells how to select and order lubes. Homestead Valve Mfg. Co.

WELDING

136 A-C Industrial Welders — Publication GEC-1259C includes product features, specifications, power requirements, operating data and list of optional features for a-c welders in 300-, 400-, and 500-amp ratings. General Electric Co.

137 Welding Guide — Now in its fifth printing, this 40-pp booklet is a handy, on-the-job reference for all types of welding with manufacturer's electrodes and gas rods. It tells what rod to use for any job, how to use the rod, what amperage to use, plus hardness and chemical content of the rod. Also includes a cause-and-solution trouble chart, table of steel hardness numbers. Marquette Mfg. Co.

138 Welding Process — Three new bulletins are offered on Unionarc welding, a semi-automatic process using a continuously-fed bare wire, powered magnetic flux, and CO2 gas. Form F-1060, 8 pp, covers production line tests on the process and features comparison of covered electrode welding to Unionarc welding. Bulletin F-1076 describes discusses development and application of the process in industry. Booklet F-1066, is an 8-pp technical article describing weld quality obtained. Linde Co., Div., Union Carbide Corp.

139 For Flux Recovery—Advantages of this company's flux recovery equipment are stressed in this 6-pp bulletin and some typical installations pictured. Function of primary separator and feeder tank, where required, are discussed. Four models, designed to meet requirements of most submerged arc welding installations, are described and recovery capacities listed. Invincible Vacuum Cleaner Mfg. Co.

CONSTRUCTION AND MAINTENANCE

140 Need a Building? — This attractive 32-pp brochure pictures and describes some industrial structures custom-engineered and built by the company. Shows how firm constructs building in one "package" to provide a permanent, custom-built structure with maximum usable floor space. Emphasis is placed on concrete panel construction. Abell-Howe Co.

141 Prefrabricated Floors — A range of industrial flooring products, some mobile, all with unusual wearing and maintenance characteristics are described in this 8-pp bulletin. Among types illustrated are steel plate floors which provide an immovable, dustless, durable all-steel floor. Others covered include prefabricated steel clad rafts. Stelcon Industrial Floors, Inc.

142 Vermiculite Concrete Use—This 8-pp summary covers a test program demonstrating adequacy of vermiculite concrete as a horizontal diaphragm. This report is of particular interest in areas subject to seismic disturbances where it is important to determine ability of roof deck materials to resist lateral forces. Vermiculite Institute.

144 Preserving Concrete Floors — Form 1404 gives step-by-step treatment and maintenance procedures for both old and new concrete floors. Tells right material, equipment and technique to use on floors exposed to spillage of gasoline and other solvents. Also tells how to harden concrete and prevent "dusting." Multi-Clean Products, Inc.

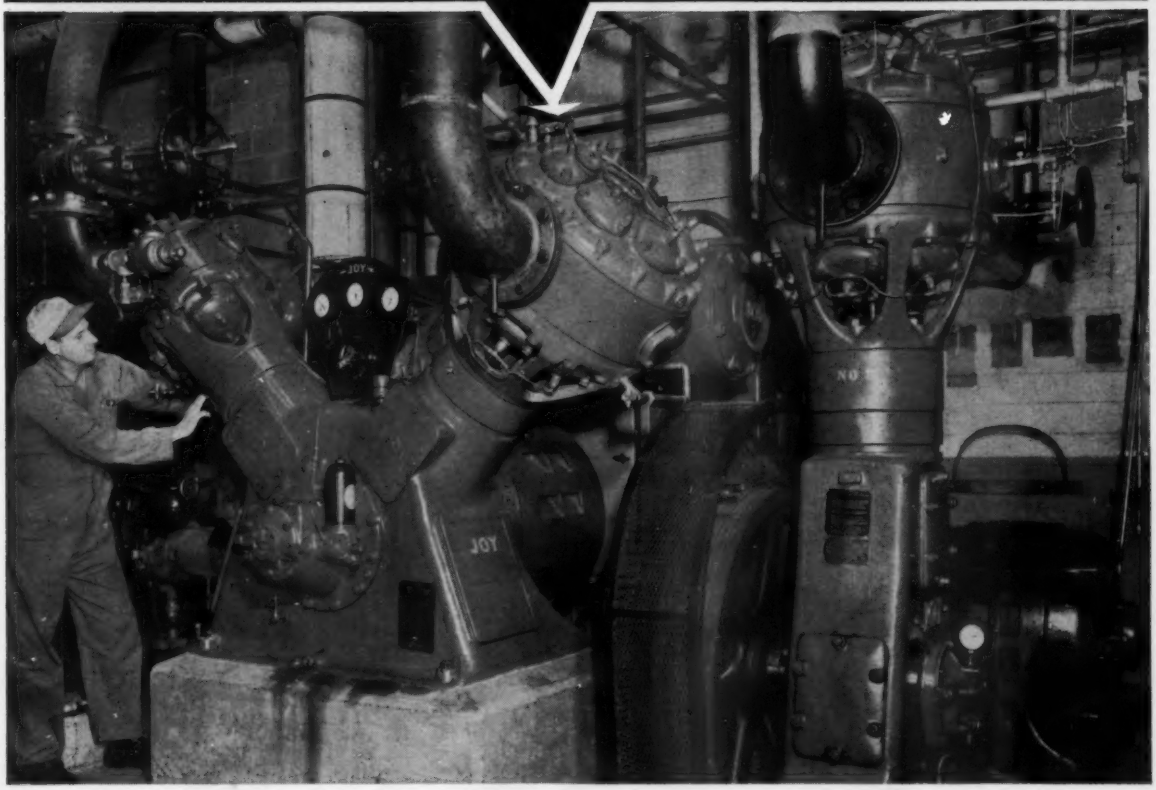
145 Conductive Floor Maintenance—This folder gives detailed information on how to maintain electrical conductive floors. Points out dangers of using an improperly maintained floor and shows and tells how to clean, protect and test this type of flooring. Safe levels of electrical conductivity (as established by the NFPA) are also listed, Huntington Laboratories, Inc.

146 Air Entraining Agent — This bulletin describes Ayr-Trap, a liquid solution of N-Tair sodium resinate with same action as additional water and fine sand but greater air entraining potency. Describes briefly Ayr-Trap's advantages and functions, tells how to use it. A. C. Horn Companies, Div., Sun Chemical Corp.

(More Bulletins on page 279)

They Needed More Oil-Free Compressed Air But Had Limited Space

A Third Joy Unit Solved it!



A West Coast Company needed more oil-free compressed air . . . in a hurry! However, there just wasn't any space in the boiler room for additional machines. They had been operating two Joy WG-9 OL vertical compressors (the machine at right in the photo). These non-lubricated compressors had run continously . . . 24 hours a day . . . for *17,000 hours with no down time.*

So they again called Joy in on the problem. The solution: One WG-9 OL with 75 hp was taken out and replaced with a Joy WN-112 E-OL rated at 150 hp. This 974 cfm machine supplies plenty of air for the new equipment, yet is compact enough to fit into the small space available.

If you need oil-free air take advantage of Joy's more than 25 years of experience with non-lubricated compressors. Write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Co. (Canada) Limited, Gal, Ont.*

Write for FREE Bulletin 130-15

Consult a Joy Engineer

For Air and Gas Compressors, Vacuum Pumps and Boosters, Conveyors, Fans, Electrical Connectors.

WBW 16307-130

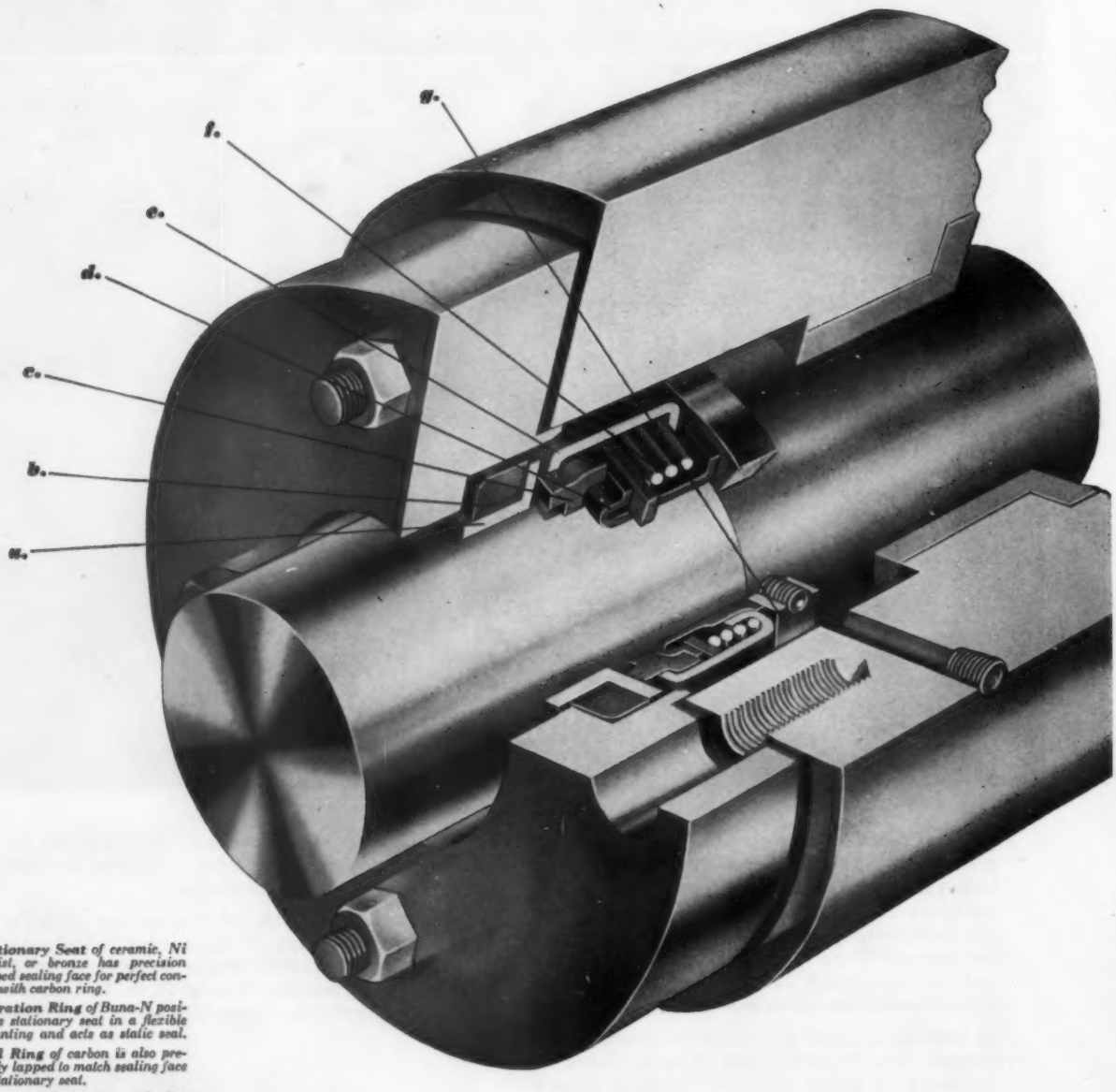
JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

For more facts circle 515 on Reply Card

MORE OF THE GARLOCK 2,000

No More Stuffing Box Maintenance!



a. **Stationary Seat** of ceramic, Ni Resist, or bronze has precision lapped sealing face for perfect contact with carbon ring.

b. **Vibration Ring** of Buna-N positions stationary seat in a flexible mounting and acts as static seal.

c. **Seal Ring** of carbon is also precisely lapped to match sealing face of stationary seat.

d. **Roll type Bellows** permits free movement of seal ring.

e. **Shell**, encases entire rotary unit and furnishes mechanical drive for seal ring.

f. **Stainless Steel Spring** with load precisely calculated to face area of seal.

g. **Stop Collar**, or shoulder, positions seal to specified operating length.

THE GARLOCK PACKING COMPANY, Palmyra, N. Y.

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

GARLOCK

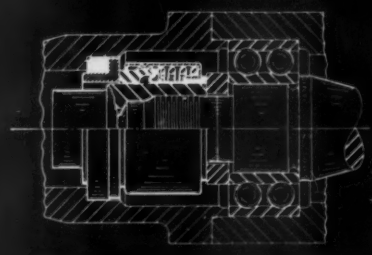
Install Garlock Package Seals on Your Present Pumps

- *ELIMINATE LEAKAGE AND SHAFT WEAR*
- *REDUCE DOWNTIME*
- *CUT MAINTENANCE COSTS*

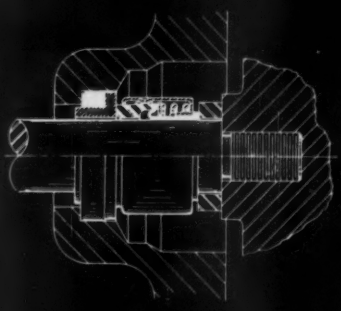
When leakage and maintenance are serious problems in the operation of your pumps you'll find a perfect answer in Garlock MECHANIPAK* Seals. Installation on new or existing equipment is simple. And, several designs are available to meet a variety of operating conditions: pressures to 150 psi, temperatures to 212° F., and shaft speeds to 2000 feet per minute. Sizes for shafts from ⅜" to 3" diameter for sealing against water, oils, alcohol, mild acids and solvents.

MECHANIPAK Seals are another important part of "the Garlock 2,000" . . . two thousand different styles of packings, gaskets and seals for every need. It's the only complete line . . . that's why you get unbiased recommendations from your Garlock representative. Ask him for complete data on this long-life, maintenance-free MECHANIPAK Seal. Or write for Folder AD-150.

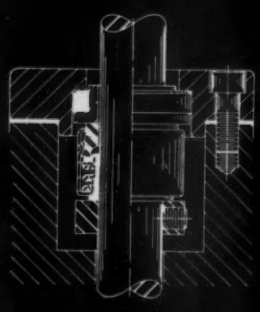
*Registered Trade Mark



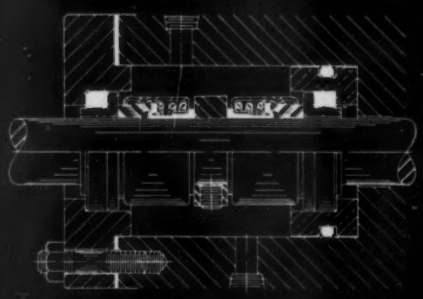
MECHANIPAK Package Seal installed on shaft for retaining lubricant in bearing.



MECHANIPAK Package Seal installed against impeller of centrifugal pump.



Package Seal installed on vertical pump shaft.



Double Package Seal installation on horizontal agitator shaft.

Packings, Gaskets, Oil Seals, Mechanical Seals, Rubber Expansion Joints, Fluorocarbon Products

For more facts circle 516 on Reply Card

For more facts circle 517 on Reply Card

HIGH-VOLTAGE MOTOR CONTROL.....

GENERAL ELECTRIC LIMITAMP* STARTERS OFFER ROLL-OUT CONTACTOR UNITS FOR EASIER INSTALLATION

Today's General Electric Limitamp starters are designed to bring you the utmost in installation ease, speed, and economy.

Key feature of this cost-cutting design is the caster-mounted contactor unit which can be easily rolled into or out of the Limitamp enclosure. After swinging out the hinge-mounted low-voltage panel, and before rolling in the contactor unit, the installation man can walk right inside the enclosure to make connections quickly and conveniently.

Once connections are completed, the panel can be closed and ready to operate within minutes. Limitamp panels control and protect motors rated 2300 to 4800 volts and ranging up to 3000 horsepower.

MORE LIMITAMP CONTROL FEATURES

Fast, economical installation is but one benefit of General Electric Limitamp control. There are many more. For instance:

- Extra five-square-foot space savings on large motor applications by using higher capacity fuses to eliminate need for extra fuse cabinet.
- Increased personnel safety provided by three-phase disconnect switch.
- Flexible arrangement of units and added space savings, with all connections made from front.
- Complete range of modifications to meet any installation requirement.

REALIZE THESE BENEFITS NOW

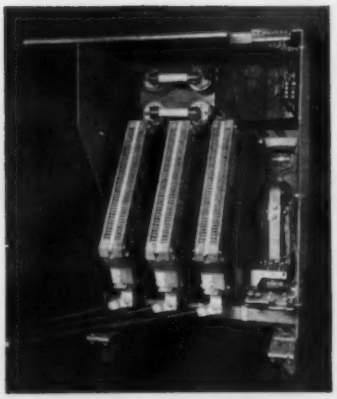
Don't be satisfied with "old-fashioned" high-voltage motor control: Specify General Electric's Limitamp control—*leader in design and performance.* Contact your G-E Apparatus Sales Office today, or write Section 783-2, General Electric Company, Schenectady, New York.

Industry Control Department, Roanoke, Virginia.

*Reg. Trade-mark of General Electric Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC



MAINTENANCE EASY on contactor; generally devices are front-removed.

THERE'S AMPLE SPACE to stand inside enclosure and make necessary connections. Yet entire control requires 50% less floor space than before.

MOUNTING GLAND
Eliminated
ON
CHEMPRO
"Wedge-Lock"
mechanical seals

The Chempro line of external "wedge-lock" seals does not require a mounting gland, or any modification to the stuffing box, to align and hold the Chempro seal in position. The patented "wedge-lock" design automatically seats the seal stator in the stuffing box in perfect face-to-face alignment with the seal rotor on the shaft. Simple and easy to install—*in only 20-30 minutes.*

OTHER ADVANTAGES

- Completely Interchangeable with Packing
- Simple in Design—Only 8 Parts
- Chempro Teflon* Shaft Packing—Chemically Inert
- External Seals Adjustable After Installation
- Parts Interchangeable Between Seal Styles
- External and Internal Seals Available—From Vacuum to 100 psi

*du Pont trademark

Write for Bulletins CP551 and 575

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

For more facts circle 518 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

A Burning Question

PLANT ENGINEERING:

"Please send me the names and addresses of companies that manufacture the 'Wigwam' refuse burners." *F. T. Marion, Ass't Engineering Manager, O. Ames Co., Parkersburg, W. Va.*

► Back in 1949, we published an article on this refuse incinerator and had to do a spot of sleuthing to find out who the manufacturer was. Then, as now, the incinerator was made by Rees Blow Pipe Mfg. Co., 2929 Fifth St., Berkeley, Calif.—*Editors.*

Handy Repair Kits for India

PLANT ENGINEERING:

"Would you please arrange to send one complete bulletin explaining 'How Reinforced Plastics Are Put To Work at General Foods' on handy repair kit as early as possible. It will be appreciated if you can advise the party concerned in India who stocks the material and can quote us on price." *T. McGowen, Superintending Chief Engineer, Jivajeerao Cotton Mills, Ltd., Birlanagar, India.*

► Additional information on the repair kit mentioned in our article of September, 1954, on the use of reinforced plastics at General Foods Corp., may be obtained from Edgar S. Auchinlos, Cordo Chemical Co., 230 Park Ave., New York 17, N.Y.—*Editors.*

Ductwork for Corrosive Fumes

PLANT ENGINEERING:

"Would you please send us additional information about the plastic ducts described in the article 'Plastic Ductwork Confines Corrosive Acid Fumes' which starts on page 116 of the May, 1957 issue of PLANT ENGINEERING." *Robert Marsh, Building Sup't., The Fresno Bee, Fresno, Calif.*

► The ductwork mentioned in our article is made by duVerre, Inc., 274 Delaware Ave., Buffalo 2, N. Y. We are sure they will be pleased to answer any inquiries from readers.—*Editors.*

Maintenance Budgets in Demand

PLANT ENGINEERING:

"Your article, 'Establishing the Maintenance Budget,' in the June, 1957 issue of PLANT ENGINEERING, was very interesting. Since we are faced with the task of forecasting maintenance costs, establishing maintenance goals and 'yardsticks,' and, in general, setting up a cost program, we are looking for further articles, books, etc. on these subjects, especially as applied to aluminum reduction plants. If possible, please refer us to literature concerning these subjects." *Edward A. Hughes, Maintenance Engineer, Kaiser Aluminum & Chemical Corp., Mead Works, Spokane, Wash.*

PLANT ENGINEERING:

"Please send us a tear sheet of the article entitled, 'Establishing the Maintenance Budget' which appeared in the June, 1957 issue of PLANT ENGINEERING." *C. I. Fellers, Assist. Supt. Plant Engineering and Maintenance, Navy Ordnance Div., Eastman Kodak Co., Rochester, N Y.*

PLANT ENGINEERING:

"Please forward to the writer's attention 10 copies of 'Establishing the Maintenance Budget,' by Clarence W. Lery, which appeared in the June, 1957 issue of PLANT ENGINEERING magazine. If copies of this article are not available, please send 10 copies of that issue of the magazine." *R. W. Dodson, Vice President—Engineering, C. K. Williams & Co., East St. Louis, Ill.*

PLANT ENGINEERING:

"The article 'Establishing the Maintenance Budget,' by Clarence W. Lery, published in your June, 1957 issue was very interesting and informative. I would appreciate tear sheets of this article as I feel it would be a tremendous help as a future reference." *W. D. Willis, Industrial Engineer, Reynolds Metals Co., La Quinta Plant, Corpus Christi, Texas.*

► We have forwarded a booklet to Mr. Hughes, comprising articles from past issues of PLANT ENGINEERING. Also, we have suggested that Mr. Hughes write to the American Management Association, 330 West 42nd St., New York 36, and to John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., or to McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y.—*Editors.*

Flooding Roofs for Cooling

PLANT ENGINEERING:

"We are interested to learn the experience of other plants regarding the cooling benefits derived from flooding flat roofs with several inches of water in the summertime.

"If you have any articles on this

whenever
water
enters
the picture . . .

■ CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

BETZ LABORATORIES INC., Philadelphia 24, Pa.

RCA SOUND WORKS 5 WAYS FOR LEEDS & NORTHRUP

Leeds & Northrup—a leader in measuring instruments and automatic controls—surveyed their sound system needs while a new plant was in the planning stage. They chose RCA, and the system that resulted performs five functions. Background music . . . code paging . . . electronic siren alarms . . . public address . . . clock signals.

One circuit carries all five of these functions, saving wiring costs. Each function has a priority rating, voice messages in emergencies topping the list. Noise in the plant ranges from normal residential levels to 120 db., but allowance for variations was simple with RCA speakers and amplifiers. Explosion-proof speakers help keep lacquer and paint-spraying areas safe. Girder-mounted amplifiers save valuable floor space, keep servicing easy.

RCA Sound works best when you plan with your RCA Engineered Sound Distributor. He's in your Classified Directory under "Public Address and Sound Systems." And an RCA Sound brochure is yours for the asking. Write today!

RCA Tmk(s) ®

RADIO CORPORATION of AMERICA

SOUND PRODUCTS CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal

For more facts circle 520 on Reply Card

BACKTALK — FORETHOUGHTS

subject, we would appreciate the opportunity of securing tear sheets or photostatic copies of them. If not, possibly you may be able to recommend text books or other publications dealing with the subject." *Richard R. Reinheimer, Plant Facilities Engineer, Stratos Div.—Fairchild Engine & Airplane Corp., Bay Shore, L. I., N. Y.*

▶ We have not published material on flooding flat roofs for cooling, but we do know that, especially in the southwest, plant engineers use felt mats for this purpose. The mats are soaked with water each day and, in some cases, it has been estimated that the indoor temperature has been lowered 10 F more than if complete flooding had been used.

It is likely that other plant engineers have had some experience in using these, or similar cooling methods. If so, we shall be pleased to hear from them and pass the information along to other readers.—*Editors.*

PE Author's Photograph

PLANT ENGINEERING:

"I am taking the liberty of asking your assistance in our search for a photograph that appeared in the March, 1957 issue of PLANT ENGINEERING. The photo, which is part of a clipping from *General Electric News,* appears on page 30.

"Mr. James Joseph is preparing an article for our 'Small Business Handbook' and is hopeful of being able to include this photo. I would be grateful for any suggestion you might have as to how we should proceed to secure this photo." *H. Siegel, Handbook Dept., Science and Mechanics, Chicago, Ill.*

▶ The photograph which Mr. Siegel refers to, shows George E. Wralstad, manager of plant facilities and maintenance of General Electric's Small Integral Motor Department, receiving a check for an article that he wrote for PLANT ENGINEERING. We are glad to give Mr. Siegel a hand in obtaining a copy of the picture.—*Editors.*

Pipe Sizing Charts Again

PLANT ENGINEERING:

"Thank you for the tear sheet of the article entitled 'Sizing Pipe for Compressed Air?' by William W. Gaylord, Consulting Engineer. We have attached bulletins covering engineering aspects of dust collection and general air flow problems and one on a dust collector which is dependent on the use of compressed air. The paper by Mr. Gaylord seems to us to be a source of information that will assist in the selection of best air piping to our new dust collector.

"We request permission to reprint this article in our next printing of one of our bulletins. We will of course give credits to both PLANT ENGINEERING and Mr. Gaylord in the printing." *Thomas V. Reinauer, Chief Engineer, Pulverizing Machinery Div., Metals Disintegrating Co., Inc., Summit, N. J.*

1958 PM Conference

PLANT ENGINEERING:

"I am seeking information on the next Plant Maintenance and Engineering Conference — particularly where and when it will be held.

"If you have such information at hand it would be appreciated if you would pass it along to me." *H. Riddell, General Supervisor, National Research Council, Ottawa, Ont., Canada.*

▶ Dates of the next Conference will be January 27, 28 and 29, 1958, but at this time we have no detailed information regarding the subjects to be discussed. However, when this information is available, a note will appear in the 'Round About With the Editors section.—*Editors.*

Scheduled Maintenance Again

PLANT ENGINEERING:

"If reprints of the article entitled 'Maintenance According to Schedule' from the May, 1956 issue of your publication are still available, I would appreciate receiving a copy.

"In addition, I would also like a mimeographed copy of the maintenance instructions described, samples of as many of the various forms used as possible and whatever other information is available." *John Van Schepen, American Molasses Co., Chicago, Ill.*

▶ A selection of articles has been forwarded.—*Editors.*

Reprinting Costs Article

PLANT ENGINEERING:

We would appreciate your permission to reprint in our house publication 'Power Notes' the article entitled, 'How Amperex Saves on Liquid Air Costs,' from the June, 1957 issue of PLANT ENGINEERING, page 148. Proper credit would be given to your publication." *C. E. Mueller, Executive Assist., Diamond Power Specialty Corp., Lancaster, Ohio.*

▶ We are always pleased to give permission to reprint material, with credit, from our magazine.—*Editors.*

...BY TELESCOPE!

Precision three-dimensional alignment to 0.001 inch per foot was demanded in installation of eight 60-ton tracer-controlled milling machines at Alcoa's Cleveland plant. This precision had to be achieved in machines mounted on floating foundations.

McGraw mechanical erection specialists licked this problem with the use of specialized optical equipment imported from England – a micro-alignment telescope with auto-collimation. F.H.McGraw & Company is the first construction company to acquire and master these new precision tools.

Whipping tough problems of industrial construction or mechanical erection, within tight time deadlines, is a specialty of McGraw men, machines, methods and materials. A McGraw engineer would be happy to discuss your construction or installation needs with you – no obligation, of course.

F. H. McGRAW & COMPANY
Engineers and Constructors to American Industry
111 N. Wabash, Chicago, Ill.
HARTFORD • NEW YORK • PITTSBURGH • MONTREAL

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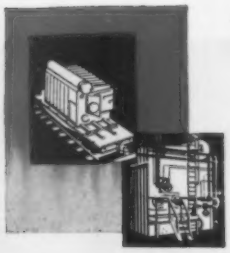
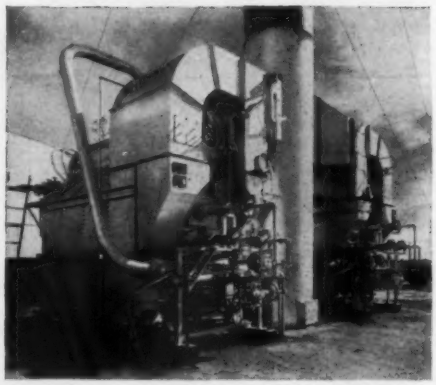


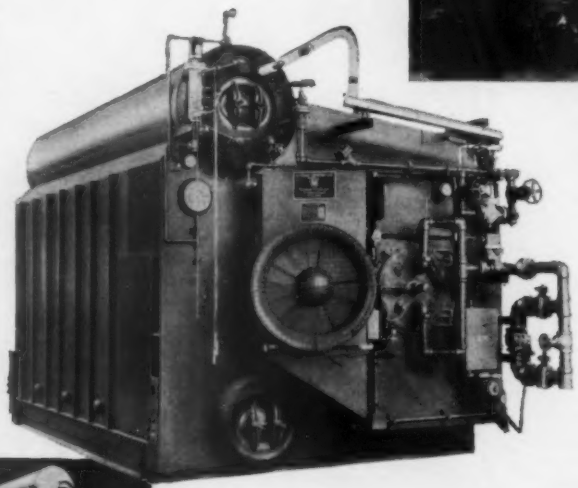
HEAT ENGINEERING by FW

extends Central Station Reliability to Standard INDUSTRIAL and PACKAGED UNITS

PACKAGED STEAM GENERATORS of the water-tube type were introduced by Foster Wheeler in 1940 — combining in a single, compact, shop-assembled unit, all the necessary facilities for the dependable and economical generation of industrial steam. Continual research and development have resulted in further improvements in design and construction, and today the FW line of Packaged Steam Generators, in capacities from 10,000 to 60,000 lb/hr, represents the last word in modern steam plant design, reflecting over half a century of service to the power generation industry. Features include 36″ steam drum and 24″ water drum, staggered boiler tubes, closely spaced waterwall tubes, water-cooled target wall, and wide choice of burners and controls.

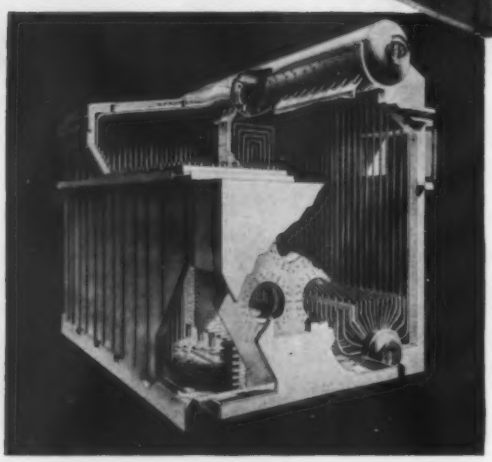


Above: Two FW packaged boilers — the first ever offered to industry — were installed for oil field drilling operations in 1940. They are still in service, delivering low-cost steam.



Left: New Foster Wheeler series AG-100 Packaged Steam Generator.

Cutaway view of typical FW Standard Steam Generator.



STANDARD PRE-ENGINEERED UNITS by Foster Wheeler offer all the advantages and economies of *standardization* for larger industrial steam generators of from 50,000 lb/hr to 450,000 lb/hr capacity. The new FW line of "SC" and "SD" standard units is heat engineered to the same standards of dependability and performance which have made Foster Wheeler steam generators first choice in many of the leading central station plants throughout the country. Features include completely water cooled walls, efficient firing arrangement, fully drainable superheater, high steam purity, unrestricted circulation, pressure-tight construction and minimum refractory baffling. For further details, send for Bulletin B-55-4.

FOSTER FW WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

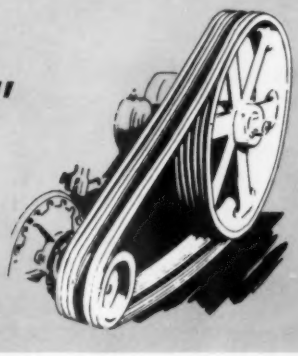
For more facts circle 522 on Reply Card

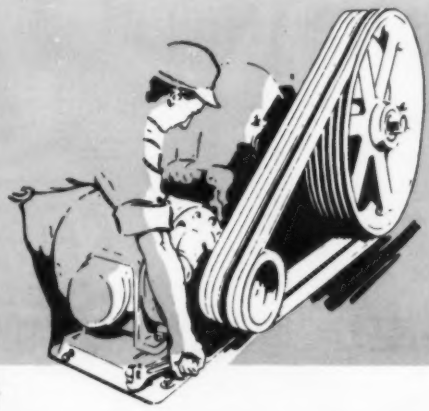
For more facts circle 523 on Reply Card ⟶

What do YOU do when V-Belts stretch or break?

"If a belt breaks, we just go on without it. Doesn't everybody?"

Many do—but then you get
- ... more slippage
- ... less production
- ... wasted power
- ... excessive wear to remaining belts
- ... uneven sheave wear



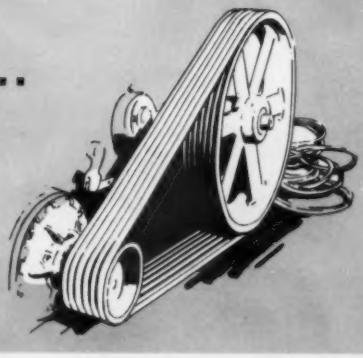


"When our belts stretch, I slide the motor back!"

That's fine, BUT ...
You run the risk of the drive heating up, causing excessive bearing wear. Tight belts wear faster.

"We replace the whole set ... we don't fool around!"

Okay, if your company can afford the waste and time. BUT if you believe in getting the most for your V-belt dollar .....



Turn page for some sound V-Belt advice from VEELOS

Veelos Adjustable V-Belts Save You Money Where Time Counts!

"My downtime headaches are over! With Veelos I cut downtime up to 90%. There's no tearing down outboard bearings, no resetting, tilting or moving motors to make belt replacement or repairs. Adding or removing one Veelos link may save you production HOURS too."

"Veelos is more than a time saver, it eliminates costly vibration! Veelos V-Belts are absolutely uniform; every stud and link is identical, every foot of every reel is perfectly balanced. By using a vibration analyzer, the Veelos representative tested my endless belts against Veelos Belts. *You'll* see the difference too, vibration reduced up to 89%, fewer rejects, less bearing and machine wear."

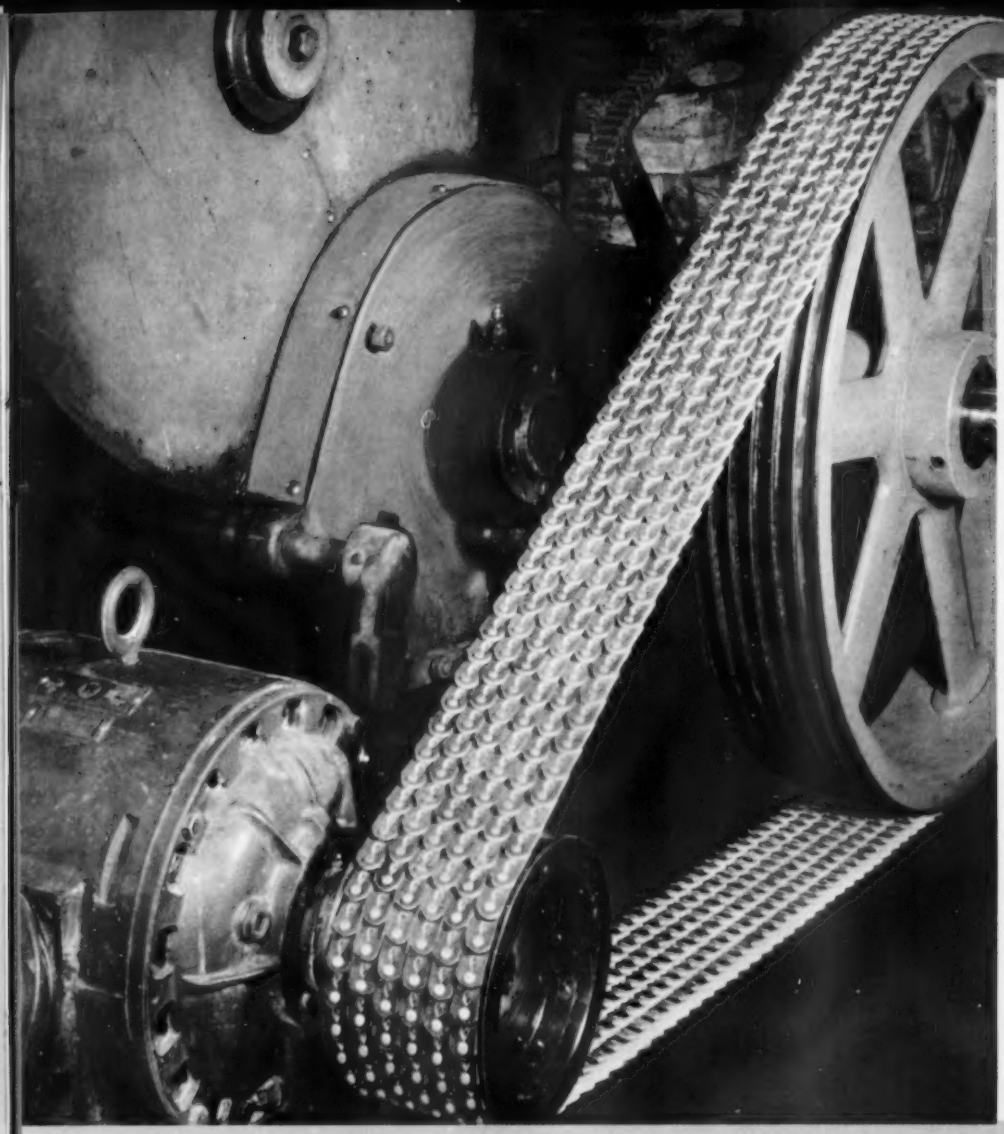
"Veelos is more flexible, cooler running, longer lasting! Sectional construction and beveled links allow greater flexibility, shorter centers, smaller sheaves, reduce slippage. 260% more surface-cooling area, plus beveled links, naturally makes Veelos cooler-running, longer-lasting."

Handy Inventory – Easy to Install – Proved Smooth Performance

316 different sizes on four reels. With four 100 ft. reels of Manheim Veelos (O,A,B,C widths) you can replace as many as 316 different sizes of endless belts—and Veelos stores in inches of space! Veelos cuts your inventory to a minimum. No obsolescence or deterioration, no worries about having specific length sizes in stock. With Veelos your inventory problems are licked.

Uncouple from reel, couple together, roll on. Merely a matter of minutes, even over outboard bearings. Remember, measure Veelos 1" per foot short of pitch length and force on sheaves by rolling. It won't stretch any more than *any* other belt on properly belted drives.

Test proves Veelos knocks out costly vibration! With electronic vibration analyzer your Veelos salesman can show you in just 15 minutes how Veelos V-Belts reduce costly vibration as much as 89%.

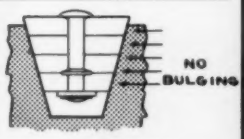


COOLER RUNNING—LONGER LIFE!

260% more surface area and beveled links keep Veelos running cool, it breathes.

BALANCED CONSTRUCTION!

Each Veelos link is identical in weight, shape and size. Assures smooth, vibrationless drive.



VEELOS FITS SHEAVE PERFECTLY!

Machine cut sides and laminated construction assure full sheave contact, even on small diameters.

MORE FLEXIBILITY!

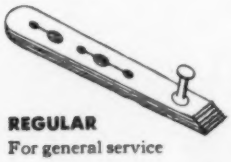
The unique beveled links and laminated construction of Veelos provide greater flexibility than any other V-belt.

Add it up...Veelos gives you more for your V-Belt dollar!

Sales are up! More and more industrial plants are now *standardizing* on Veelos V-Belts. This can mean only one fact; Veelos is more economical in the long run.

Your V-belt problems can be solved by Veelos' easy installation, vibrationless performance, lower inventory. Install Veelos on all your drives and save money.

4 types for all drives



REGULAR
For general service

OILPROOF
For oily and hot drives

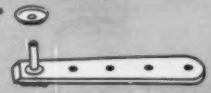
COATED
For wet or oily drives

STATIC-CONDUCTING
For explosive atmosphere

Double-V available in all sizes and types—for serpentine drives.

NEW—TD & TE VEELOS

Patented stud, cup washer and T-screw design. For use on D&E drives. Available coated, in regular and oilproof.



U.S. Pat. No. 2639622

How about a date to prove our claims? **Call the Veelos distributor nearest you.**

Turn page for his name...

Your authorized VEELOS distributor is a V-Belt expert

Call him today, he gives good service!

ALABAMA

Birmingham: Continental Gin Co. Wimberly & Thomas Hardware Co. **Mobile:** Turner Supply Co.

ARKANSAS

Cresselt: Tri-State Mill Supply Co. **Fort Smith:** Bruce Co. **Little Rock:** Hollis & Co. **Pine Bluff:** Tri-State Mill Supply Co. **Magnolia:** Mid-Continent Supply Co.

CALIFORNIA

Bakersfield: Power Transmission Equipment Co. **Fresno:** Pacific Mill & Mine Supply Co. **Long Beach:** Jones Hardware Co., Ltd. **Los Angeles:** Andrews Hardware & Metal Co. Western Belting & Mechanicals. **Oakland:** Hoffmeyer Belting & Supply Co. **Oxnard:** Gordon Duff, Inc. **Pomona:** Reliable Bearing & Supply Co. **Sacramento:** The Sacramento Rubber Co. Van Voorhies-Phinney Co. **Salinas:** Seaboard Equipment & Supply Co. **San Bernardino:** Reliable Bearing & Supply Co. **SanDiego:** Standard Iron SupplyCo. WinnSupply Co. **San Francisco:** Bearing Engineering Co. Darcoid Co. of Calif. **San Jose:** Orchard Supply Building Co. **San Pedro:** Marine Hardware Co. **South Gate:** Power Transmission Equipment Co. **Stockton:** Jones Bearing Co.

COLORADO

Denver: Johnson Supply Co. **Sterling:** Mid-Continent Supply Co.

CONNECTICUT

Bridgeport: Electric Maintenance Service Co. **Hartford:** J. R. Brasel Co. Sullivan Tool & Supply. **New Britain:** Smith & Kleben. **New Haven:** C. S. Mersick & Co. **New London:** United Electric Supply Co. **Norwich:** Plank Electric Co. **Stamford:** Frank M. West Co. **Waterbury:** Charles A. Templeton.

DELAWARE

Bridgeville: O. A. Newton & Son Co. **Lewes:** C. H. Ellis & Co. **Wilmington:** Briggs Rubber Products Co. Bruce Industrial Supply & Equipment Co.

DISTRICT OF COLUMBIA

Washington: Noland Co.

FLORIDA

Fernandina: Standard Hardware Co. **Fort Lauderdale:** Vogel's Marine Supply Co. **Fort Myers:** Norman Auto Supply. **Jacksonville:** Miller Machinery & Supply Co. **Key West:** Standard Marine Supply Co. **Lakeland:** Wakeman Corp. **Miami:** Central Machinery & Supply Co. Hopkins-Carter Hardware Co. Miami Ship Chandlery. **Panama City:** West Florida Electric Service Co. **Pensacola:** Gulf Marine Supply Co. **Saint Augustine:** Marine Supply & Oil Co. **Tampa:** Industrial Supply Corp. **Winter Haven:** Haven Mill Supply Co.

GEORGIA

Albany: W. F. Glisson Co. **Atlanta:** Pye-Barker Supply Co. Southern Belting Co. **Augusta:** Richmond Supply Co. Toole Supply Co. **Brunswick:** Parker, Helms & Langston. **Columbus:** Columbus Iron Works Co. **Dalton:** Southern Wholesalers. **Dublin:** Logger Supply & Service. **Macon:** Macon Supply Co. **Savannah:** John D. Robinson Co. Savannah Ship Chandlery & Supply Co. **Thomasville:** Tom Horne Supply Co. **Valdosta:** Valdosta Armature Works. **Waycross:** Waycross Battery & Electric Co. **West Point:** Georgia-Alabama Supply Co.

IDAHO

Coeur d'Alene: Gardner Supply Co. **Wallace:** Gardner Supply Co.

ILLINOIS

Aurora: Dietz Industrial Supply Co. **Bloomington:** Keiser-VanLeer Asso. **Cairo:** Simmons Supply Co. **Chicago:** Chicago Pulley & Shafting Co. Quality Rubber & Transmission Co. **Decatur:** Field & Shorb Co. **Pana:** Pana Iron Stores Co. **Peoria:** Transmission Supply Co. **Rockford:** Robert Vanron, Inc. Rockford Supply & Equipment Co. **Salem:** The Happy Co. **Taylorville:** Power Scoop Corp.

INDIANA

Anderson: Universal Electric Co. **Bloomington:** Seward & Co. **Columbus:** Quality Mill Supply Co. **Elkhart:** C. S. Kegerreis Supply. **Evansville:** Evansville Supply Co. **Fort Wayne:** National Mill Supply. Tools & Abrasives. **Hammond:** Standard Equipment & Supply Corp. **Indianapolis:** Central Rubber & Supply Co. **Kokomo:** Northern Indiana Supply Co. **Lafayette:** Kirby Risk Supply Co. **Logansport:** Baker Specialty & Supply Co. **Marion:** Universal Electric Co. **Muncie:** Universal Electric Co. **Richmond:** Universal Electric Co. **Terre Haute:** Coldwell & Co.

IOWA

Cedar Rapids: Allen Supply Co. **Davenport:** Industrial Engineering Equipment Co. **Des Moines:** Electrical Engineering & Equipment Co. **Fort Dodge:** Leighton Supply Co. **Muscatine:** Barry Co.

KANSAS

Ellinwood: The Happy Co. **Great Bend:** Mid-Continent Supply Co. **Liberal:** Mid-Continent Supply Co. **Plainville:** Mid-Continent Supply Co. **Wichita:** Bearing Service Co. Reschke Machine Works.

KENTUCKY

Frankfort: Industrial Supply Co. **Lexington:** Womwell Automotive Parts Co. **Louisville:** Neill-LaVielle Supply Co. **Paducah:** Henry A. Petter Supply Co.

LOUISIANA

Harvey: Mid-Continent Supply Co. **Houma:** Mid-Continent Supply Co. **Lake Charles:** Mid-Continent Supply Co. **New Iberia:** Mid-Continent Supply Co. **New Orleans:** McLellan Equipment Co. **Shreveport:** Hollis & Co. · Mid-Continent Supply Co.

MAINE

Brewer: Stanley J. Leen Co. **Portland:** W. L. Blake & Co. Edwards & Walker Co.

MARYLAND

Baltimore: A. K. Robins & Co., Inc. Fleck Engineering Co., Inc. W. L. Reynolds Co. **Centreville:** Auto Parts & Equipment Co. **Cumberland:** McKaig's. **Frederick:** Automotive Industrial Supply. **Glen Burnie:** Briggs Rubber Products Co. **Hagerstown:** Folts Mfg. & Supply Co. Noland Co. **Salisbury:** R. D. Grier & Sons Co.

MASSACHUSETTS

Avon: Brockton Operating Co. **Boston:** Chandler & Farquhar Co. **Cambridge:** Lewis E. Tracy Co. **Framingham:** Arrow Electric Supply Co. **Gardner:** Bibeau's Hardware Co. **Holyoke:** Chase & Cooledge Co. **Lawrence:** Treat Hardware Corp. **New Bedford:** Machinery Sales Corp. Russell, Milhench & Harrison Co. **Orange:** Chase Turbine Manufacturing Co. **Pittsfield:** Berkshire Mill Supply Co. **Provincetown:** Lands End Marine Supply. **Springfield:** W. J. Foss Co. **Taunton:** The Pierce Hardware Co. **Worcester:** Brierly, Lombard & Co.

MICHIGAN

Adrian: Utility & Industrial Supply Co. **Alpena:** Alpena Supply Co. **Ann Arbor:** Royall, Inc. **Battle Creek:** Kendall Hardware-Mill Supply Co. **Benton Harbor:** Industrial Equipment & Supply Co. **Detroit:** D. P. Brown & Co. W. C. DuComb Co. **Escanaba:** Chatfield Machine & Foundry Co. **Flint:** Granseden-Hall Co. **Grand Rapids:** Hayden Supply Co. **Jackson:** Utility & Industrial Supply Co. **Kalamazoo:** Kendall Hardware-Mill Supply Co. **Lansing:** Mill Supplies Corp. **Marquette:** C. T. DeHaas Co. **Muskegon:** Factory Supply Co. **Petoskey:** Fochtman Motor Co. **Pontiac:** Oakland Mill Supply Co. **Port Huron:** Port Huron Equipment Co. **Saginaw:** Flack-Pennell Co. **Sault Ste. Marie:** Soo Hardware Co. **Traverse City:** Fochtman Motor Co.

MINNESOTA

Duluth: Minnesota Bearing Co. **Hibbing:** W. S. Nott Co. **Minneapolis:** W. S. Nott Co. **St. Paul:** F. H. Bathke Co.

MISSISSIPPI

Laurel: Mid-Continent Supply Co. **Meridian:** Soule Steam Feed Works. **Natchez:** Mid-Continent Supply Co. **Vicksburg:** Southern Engineering & Supply Co.

MISSOURI

Kansas City: Bearing Distributors, Langdon Supply Co. **St. Louis:** Missouri Belting Co. R-J Bearings Corp. **Springfield:** Industrial Equipment Corp.

MONTANA

Great Falls: Hines Motor Supply Co.

NEBRASKA

Kimball: Mid-Continent Supply Co. **Omaha:** Nicholson Supply Co.

NEW HAMPSHIRE

Berlin: Kenneth F. Harvey. **Keene:** Perkins, Bassett & Wright. **Manchester:** Cohen Machinery Co.

NEW JERSEY

Camden: William H. Fisler Co. **Hawthorne:** Sievers Belting. **Hoboken:** Crown Industrial Supply Co. **Millville:** National Distributors. **Newark:** Couse & Bolten Co. **New Brunswick** Slingman Industrial Supply Co. **Passaic:** New Jersey Engineering & Supply Co. **Trenton:** Wiley-Hughes Supply Co.

NEW MEXICO

Albuquerque: Gorman Eng. Co. of New Mexico. **Carlsbad:** Hall Machine & Welding Co. **Eunice:** Mid-Continent Supply Co. **Farmington:** Mid-Continent Supply Co. **Gallup:** Gallup Car Parts & Supply. **Hobbs:** Mid-Continent Supply Co.

NEW YORK

Albany: R. B. Wing & Son. **Amsterdam:** John E. Larrabee Co. **Bellmore, L. I.:** Central Belting Co. **Binghamton:** Binghamton Industrial Supply Co. Ellis W. Morse Co. **Brooklyn:** H. L. Dickie Co. North Side Leather Belting Co. Superior Oil & Belting Co. E. A. Wildermuth. **Buffalo:** Industrial Transmissions. **Elmira:** LaValley McLeod. **Glens Falls:** J. E. Sawyer & Co. **Hempstead:** Center Island Sales. **Jamestown:** Clark Hardware Co. **Lindenhurst:** Long Island Machinery Sales Corp. **Long Island City:** Furst Electric Co. **Newburgh:** W. L. Smith Co. **New York:** Baldwin Belting. L. C. Biglow & Co. Carter, Milchman & Frank. Darcoid Co. General Chain & Belt Co. Hansen & Yorke Co. **Olean:** LaValley McLeod. **Rochester:** Cross Bros. Co. **Schenectady:** LaValley McLeod. **Syracuse:** Syracuse Supply Co. **Troy:** Troy Belting & Supply Co. **Utica:** Colerick Supply Co. Mather, Evans & Diehl Co. **Watertown:** W. W. Conde Hardware Co. **Yonkers:** Joseph C. Ryan & Sons.

NORTH CAROLINA

Asheville: Asheville Industrial Supply. **Charlotte:** Mise Co. Textile Mill Supply Co. **Durham:** Dillon Supply Co. **Elizabeth City:** Sanders Co. **Gastonia:** Griffin Supply Co. **Goldsboro:** Dillon Supply Co. **Greensboro:** Odell Mill Supply Co. **Hickory:** Smith Courtney Co. **Lincolnton:** Carolina Roller & Supply Co. **Mount Airy:** Merritt Machine & Supply Co. **New Bern:** Carolina Rubber & Supply Co. **Plymouth:** East Carolina Supply Co. **Raleigh:** Dillon Supply Co. **Rocky Mount:** Dillon Supply Co. **Sanford:** General Foundry & Machine Co. **Shelby:** Shelby Supply Co.

OHIO

Akron: M. F. Murdock Co. **Barberton:** Tenny Tool & Supply Co. **Canton:** Service Tool & Supply Co. **Cincinnati:** The Queen City Supply Co. Regal Belting Co. **Cleveland:** Cleveland Oak Belting Co. **Columbus:** E. A. Kinsey Co. **Dayton:** Dills Supply Co. **Lima:** Steele's Industrial Supplies. **Marietta:** McJunkin Corp. **Sandusky:** Associated Suppliers. **Springfield:** Mad River Supply Co. **Steubenville:** Industrial Supplies Co. **Toledo:** Kirkby Machinery & Supply Co. The Ohio Belting & Transmission Co. **Warren:** Trumbull Supply & Mfg. Co. **Zanesville:** Roekel Co.

OKLAHOMA

Chickasha: Chickasha Gin & Mill Supplies. **Duncan:** Mid-Continent Supply Co. **Oklahoma City:** Marshall Supply & Equipment Co. Mid-Continent Supply Co. **Seminole:** The Happy Co. Mid-Continent Supply Co. **Tulsa:** The Happy Co. Marshall Supply & Equipment Co.

OREGON

Portland: General Rubber & Supply Co. Harris Supply Co. Monarch Belting & Supply Co.

PENNSYLVANIA

Allentown: Everson Electric Co. **Altoona:** Blair Electric Service Co. **Bradford:** Bovaird & Co. **Bridgeport:** Lloyd H. Daub. **Chester:** John Bridge Sons. **Easton:** W. A. Tydeman & Son. **Erie:** H. P. Weller Supply Co. **Greensburg:** Westmoreland Hardware Co. **Johnstown:** Thackray Co. **Lancaster:** Reilly Bros & Raub. **Lebanon:** Bamberger's. Geo Krause Hardware Co. **Lewisburg:** Busser Supply Co. **New Castle:** Clinton D. Keagy. **Philadelphia:** Charles Bond Co., D. P. Brown & Co., Stockwell Rubber Co., Transmission Engineering Co. **Pittsburgh:** Colonial Supply Co., Supplies, Inc. **Pottstown:** J. Fegely & Son Hardware Co. **Reading:** Brown Engineering Co. **Sunbury:** Hackett Hardware Stores. **Warren:** Pickett Hardware Co. **Washington:** Fairmont Supply Co. **Wilkes-Barre:** Holmes-Metallic Co. **Williamsport:** E. Keeler Co. **York:** York Machinery & Supply Co.

RHODE ISLAND

Newport: J. T. O'Connell. **Providence:** Machine Parts Corp., Providence Mill Supply Co.

SOUTH CAROLINA

Charleston: Allen & Webb, Charleston Supply Co. **Florence:** O'Brian-Mace Co. **Greenville:** Greenville Textile Supply Co. **Greenwood:** Dixie Hardware & Mill Supplies. **Spartanburg:** Brown-Rogers-Dixson Co. **Summerville:** Southern Mill Supply Co. **Sumter:** B. L. Montague Co.

TENNESSEE

Chattanooga: Noland Co. **Kingsport:** Slip-Not Belting Corp. **Knoxville:** Hoyt N. Payne Co. **Memphis:** Lewis Supply Co. **Nashville:** Keith Simmons Co., Industrial Sales Co.

TEXAS

Abilene: Mid-Continent Supply Co. **Amarillo:** General Sales. **Andrews:** Mid-Continent Supply Co. **Beaumont:** Brance-Krachy Co. **Bowie:** Mid-Continent Supply Co. **Brownfield:** Mid-Continenet Supply Co. **Brownsville:** Alamo Iron Works. **Corpus Christi:** Alamo Iron Works, Brance-Krachy Co. **Dallas:** Central Engineering & Supply Co. **El Paso:** E. Paso Saw & Belting Co. **Falfurrias:** Mid-Continent Supply Co. **Fort Worth:** General Industrial Supply Co., Mid-Continent Supply Co. **Gainesville:** Mid-Continent Supply Co. **Harlingen:** San Antonio Machine & Supply Co. **Houston:** Brance-Krachy Co., Mid-Continent Supply Co. **Kermit:** Mid-Continent Supply Co. **Kilgore:** American Supply Co., Mid-Continent Supply Co. **Lubbock:** Bearing Specialist Co. **Odessa:** The Happy Co., Mid-Continent Supply Co. **Refugio:** Mid-Continent Supply Co. **San Angelo:** Alamo Iron Works. **San Antonio:** Alamo Iron Works. **Snyder:** Mid-Continent Supply Co. **Sundown:** Mid-Continent Supply Co. **Waco:** D. E. Shipp Belting Co. **Wichita Falls:** Hornsby Heavy Hardware Co., Mid-Continent Supply Co.

UTAH

Salt Lake City: Galigher Co.

VERMONT

Barre: Reynolds & Son. **Burlington:** Lamson Motor Service. **Poultney:** Gray Foundry. **St. Johnsbury:** Reed Supply Co.

VIRGINIA

Bassett: Blue Ridge Hardware Supply Co. **Grundy** Buchanan Williamson Supply Co. **Harrisonburg:** Rockingham Milling Co. **Lynchburg:** Ferebee-Johnson Co. **Richmond:** Central Belting, Hose & Rubber Co. **Roanoke:** Noland Co. **Waynesboro:** Mize Supply Co.

WASHINGTON

Everett: Everett Transmission & Rubber Co. **Seattle:** Industrial Products Co., Nordby Supply Co. **Spokane:** Calkins Mfg. Co., Kilmer & Sons Co., Nott-Atwater Co. **Tacoma:** Paramount Supply Co. **Walla Walla:** Morrison Supply Co. **Wenatchee:** Wells & Wade. **Yakima:** Central Chain & Transmission Co.

WEST VIRGINIA

Bluefield: Bluefield Hardware Co. **Charleston:** Industrial Rubber Products Co., Persingers, Inc. **Fairmont:** Fairmont Supply Co. **Huntington:** Banks-Miller Supply Co. **Martinsburg:** W. H. Heiston & Son. **Parkersburg:** Tri State Tool & Supply Co. **Wheeling:** Wheeling Rubber Products, Wheeling Plumbing & Industrial Supply Co. **Williamson:** Williamson Supply Co.

WISCONSIN

Eau Claire: W. H. Hobbs Supply Co. **Green Bay:** Libert Bearing Co. **LaCrosse:** Wiggert Bros. **Madison:** Richard E. Ela Co. **Manitowoc:** J. J. Stangel Hardware Co. **Milwaukee:** Machell Rubber & Supply Co. **Sheboygan:** Honold & LaPage. **Wausau:** Wisconsin River Supply Co.

WYOMING

Casper: Mid-Continent Supply Co. **Newcastle:** Mid-Continent Supply Co.

VEELOS® THE BALANCED LINK V-BELT

Known as Veelink outside of U.S.A.

MANHEIM

MANUFACTURING & BELTING CO.
2000 STIEGEL ST., MANHEIM, PA.

Write for Veelos Data Book or Veelos Vibration Demonstration

"Industrial Belt Specialists Since 1911"

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Rolling Steel Doors

Manually, Mechanically or Electrically Operated

MAHON CHAIN-GEAR OPERATOR

MAHON STANDARD POWER OPERATOR 920-P

In truck openings, loading dock openings, and railroad openings, in modern plants and warehouses where the time element and operating space requirements are primary considerations, the rolling steel door has no equal . . . because, a quick-opening, quick-closing, power operated rolling steel door saves both time and space. The vertical roll-up action is fast—requires no usable space either inside or outside the opening. And there are no overhead tracks or other obstructions to restrict headroom and interfere with crane handling or stacking of goods or materials adjacent to the door opening. No other type of door can give you this space-saving compactness in operation . . . and no other type of door can give you the positive security, firesafety and permanence inherent in a good rolling steel door. The all-metal construction of a rolling steel door reduces maintenance to a negligible factor, and assures you a lifetime of continuous, trouble-free service. When you buy a rolling steel door, it will pay you to check specifications carefully . . . you'll find that Mahon doors are built better to give you better service over a longer period of time —for instance, the galvanized steel in Mahon curtain slats is BONDERIZED and DIP-COATED with Synthetic Enamel which is baked on at 350° F. prior to roll-forming. This is just one of the extra-value features of Mahon Rolling Steel Doors . . . comparison will disclose many others that add up to a much better door investment. See Sweet's Files for information or write for Catalogue G-57.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Fire Walls; Insulated Metal Curtain Walls; Electrified M-Floors; Acoustical and Troffer Forms; and Steel Roof Decks and Long Span M-Decks.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Shown above are Eight of Thirty-four Mahon Rolling Steel Doors installed in a new, modern building for the Giant Food Distribution Center, Landover, Maryland. Eighteen of these doors were installed in Double Truck Openings and Four in Railroad Openings. Stanford Construction Company, Inc., General Contractors.

MAHON

For more facts circle 524 on Reply Card

THEY CHANGE THEIR OWN FILTERS-AUTOMATICALLY!

HERMAN NELSON

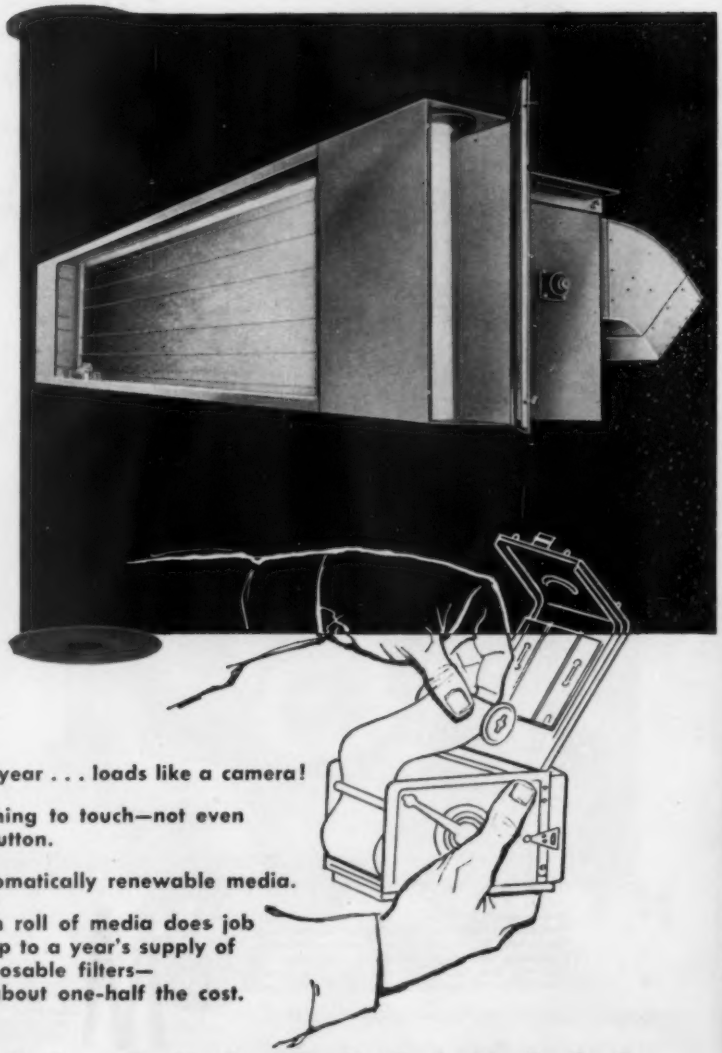
ROLL O VENT

AIR HANDLING UNITS

NEW, COMPLETELY AUTOMATIC IN OPERATION, the exclusive AAF Roll-O-Matic Air Filter Principle is now available on three leading Herman Nelson ROLL-O-VENT air handling units. You simply put the roll of media in the unit—*and forget it*—for up to a year! Operation is completely automatic, and under normal conditions costs just half that of ordinary disposable filters.

You gain maximum filtering efficiency *all year 'round*—with little or no maintenance. There is no reduction of efficiency in the system due to clogged filters. Furthermore, the system is always in balance —air flow *constant*—because clean media is automatically changed at just the right time!

Take advantage of the important time and cost-saving features provided by this exclusive AAF development. Write for full details on "packaged" Herman Nelson ROLL-O-VENT heating, ventilating and cooling units. Ask for fact-filled Bulletin 780. Address Dept. 228.

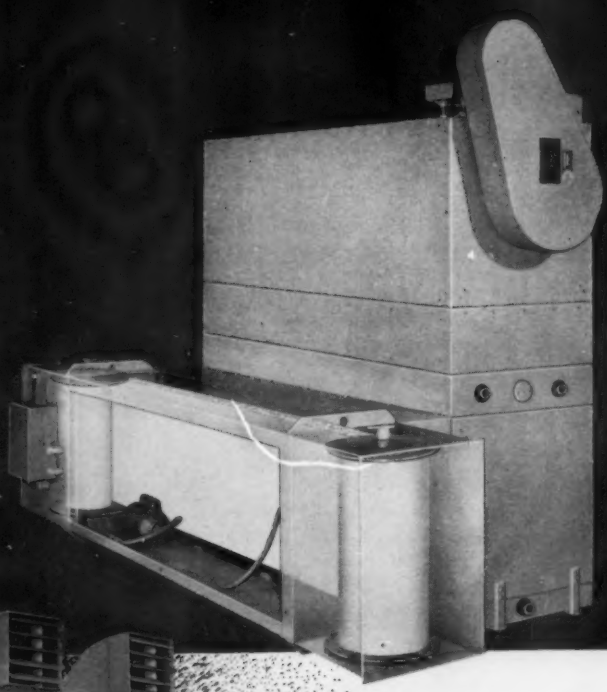


One roll of media lasts up to a year . . . loads like a camera!

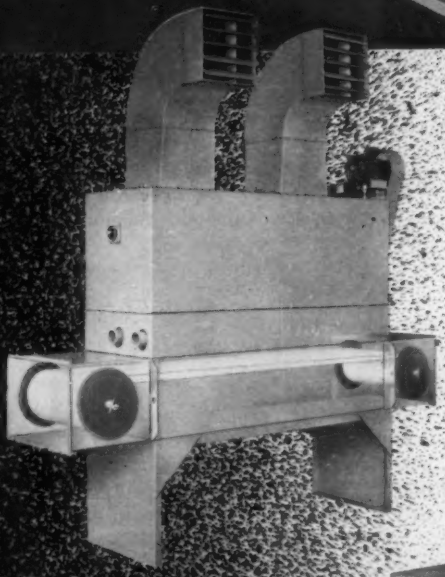
- **Nothing to touch—not even a button.**
- **Automatically renewable media.**
- **Each roll of media does job of up to a year's supply of disposable filters— at about one-half the cost.**

BETTER AIR IS OUR BUSINESS

For more facts circle 525 on Reply Card

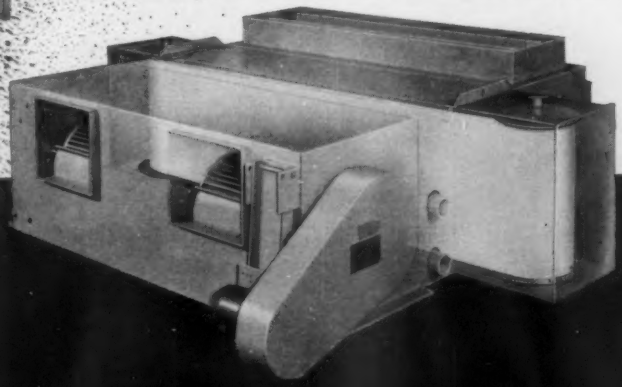


Herman Nelson
Roll-O-Vent
Air Conditioning Unit —*IT CHANGES ITS OWN FILTER—AUTOMATICALLY*



Herman Nelson
Roll-O-Vent
Industrial Unit Heater —*IT CHANGES ITS OWN FILTER—AUTOMATICALLY*

Herman Nelson
Roll-O-Vent
Heating And Ventilating Unit —*IT CHANGES ITS OWN FILTER—AUTOMATICALLY*



AAF herman nelson

American Air Filter

Company, Inc.
215 Central Avenue • Louisville 8, Kentucky

PLANT ENGINEERS' DIGEST

so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Mine Communications Through Wire Rope

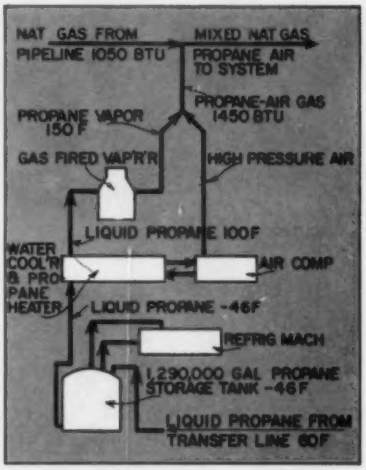
WIRE ROPE with electrical conductors imbedded in the core, have helped to solve a communications problem in a copper mine. A 2700-ft shaft rope containing copper conductors in a polyvinyl chloride plastic jacket, was installed. Communications between the moving cage or skip and the hoisting engineer are greatly simplified.

Prior to using this type of rope, communications were based on a system of electronic signals. A radio frequency was fed into the hoisting rope by a transmitter in the cage and delivered to a receiver situated near the sheave wheel. Electronic devices worked erratically and were limited in their application, since they could do only two of three jobs — sending hoist signals, indicating slack rope and showing the position of the skip door. An independent circuit was required for the skip door. This is now provided by the wired hoisting rope. *From Porter People, Products and Places, published by H. K. Porter Company, Inc., New York, N. Y.*

Refrigerated Propane Storage For Operational Use

LIQUID PROPANE is being stored by refrigeration, instead of under pressure at the Riverdale, Ga. plant of the Atlanta Gas Light Co. system. While there have been pilot refrigerated storage plants for propane, this is the first in full operational use in this country.

By a process in which the propane acts as its own refrigerant, it is kept at—46 F. This low low temperature is provided by a continuous three-step refrigeration cycle: 1. Propane vapor containing heat is removed from the tank and compressed to 200 psi; 2. The vapor is condensed to liquid with removal of heat by air cooled condensers; 3. As the liquid propane is reintroduced into the low pressure tank, it vaporizes and chills with the sudden release of pressure.


NAT GAS FROM PIPELINE 1050 BTU
MIXED NAT GAS PROPANE AIR TO SYSTEM
PROPANE-AIR GAS 1450 BTU
PROPANE VAPOR 150 F
GAS FIRED VAP'R'R
HIGH PRESSURE AIR
LIQUID PROPANE 100F
WATER COOL'R & PRO PANE HEATER
AIR COMP
LIQUID PROPANE -46F
REFRIG MACH
1,290,000 GAL PROPANE STORAGE TANK -46F
LIQUID PROPANE FROM TRANSFER LINE 60F

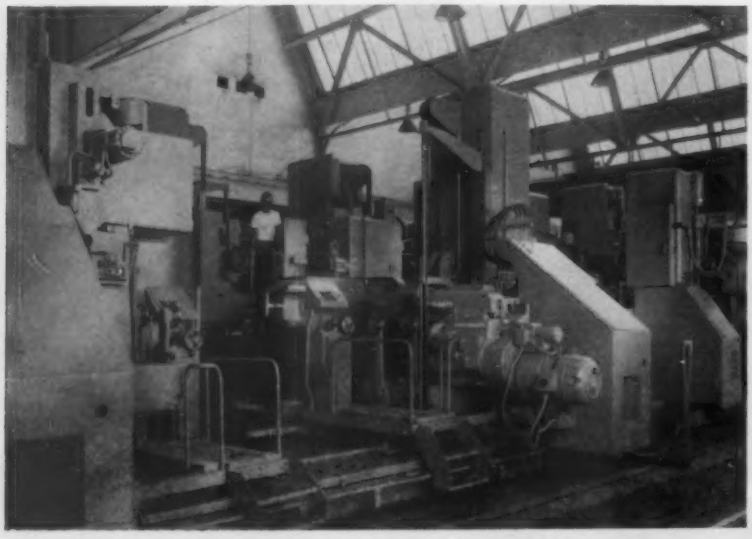
Flow diagram chilled propane storage

Because there was no safety code

(Continued on page 42)

Seven Milling Machines, Plus Two Fixture Bases, Make Versatile Unit

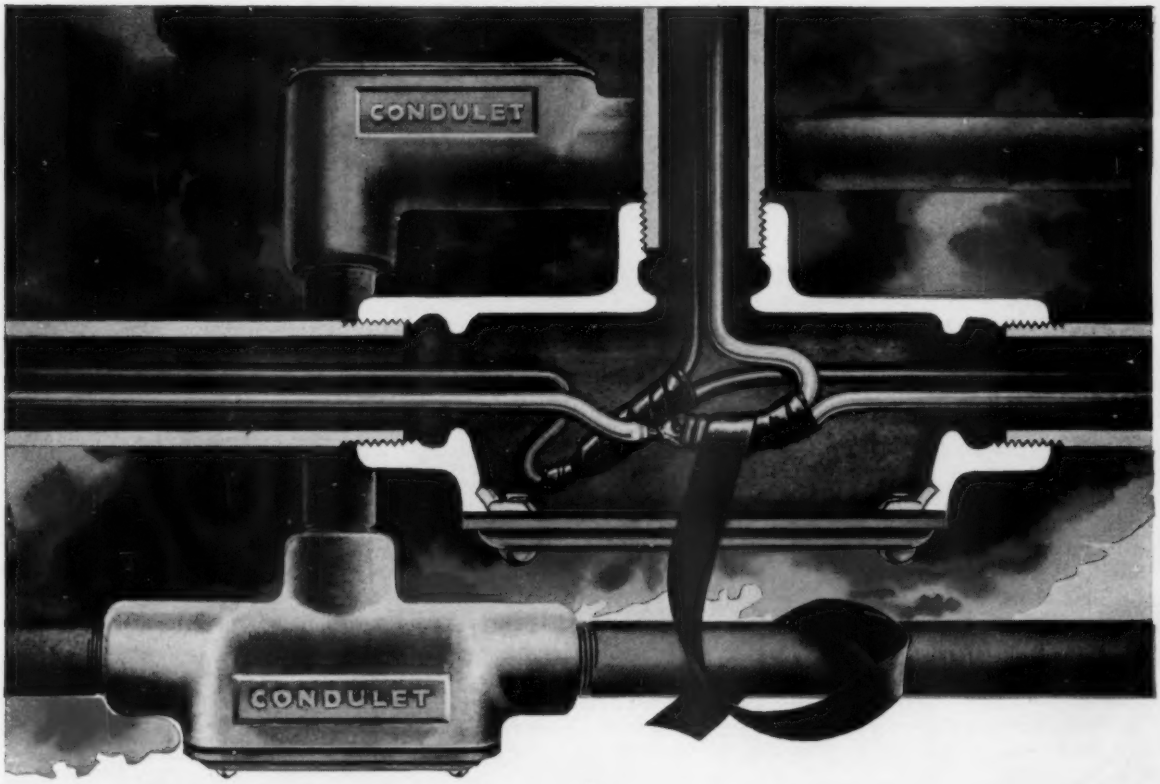
SEVEN FLOOR-TYPE milling stations positioned around two separate fixture bases form a milling station in our plant. It is used for milling various surfaces of columns for dial type milling machines. Seventeen milling operations can be performed on horizontal and vertical columns.

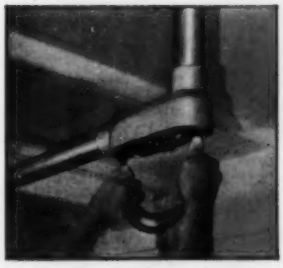


Special milling unit is made up of seven milling stations, two fixture bases

All seven stations are designed so that several operations may be done simultaneously. For example, instead of shifting the heavy casting in order to machine each surface, the casting is clamped to a rigid fixture where several milling operations are performed at the four surrounding milling stations, At the same time, the other operations are being performed on another casting at the three milling stations located around the second fixture.

Automatic machining cycles on many of these cutting stations help minimize unproductive time for these operations. In addition, the milling stations are equipped with several other time saving features such as automatic chip removal, centralized operating controls, traverse rates up to 100 in. per minute, speeds up to 550 rpm and feed rates ranging from one to 50 in. per minute. *From Report, published by Cincinnati Milling Machine Co.*





Condulets install easily. There's room inside to do a good wiring job. No sharp edges to scrape knuckles or cut into insulation. Once installed, wiring, Condulet and conduit are there to stay—yet wiring remains easily accessible for future alterations.

Used everywhere. There is a Condulet for every need, in every conceivable industry. Each one bears the marks of superior construction. Each is made by craftsmen to the standards craftsmen demand!

Why electrical engineers specify

"CONDULETS... OR APPROVED EQUAL"

Electrical engineers are called upon daily to make careful choices of materials for companies who depend upon their judgment for the quality of finished work.

"Condulets or approved equal" is the common notation on specification prints everywhere. It is used to indicate *the standard of performance* demanded by the electrical engineer.

More than 15,000 items of Condulet electrical equipment offer a broad choice of explosion-proof, dust-tight or conventional construction unparalleled for safety and dependability. In *any* plant, the chances are 2 to 1 you will find Condulet junctions, switches, conduit fittings, plugs and receptacles, panelboards, pushbutton stations, motor control centers, etc. Wherever you see the name Condulet, you see the standard by which maximum performance is measured.

A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

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For more facts circle 526 on Reply Card

PLANT ENGINEERS' DIGEST

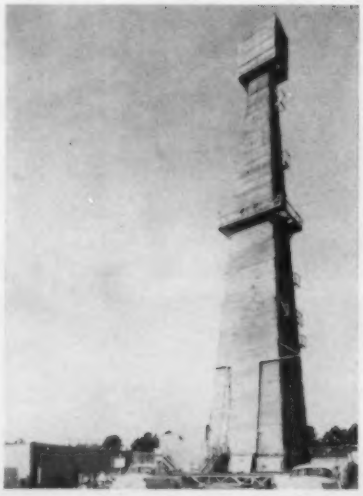
(Digest begins on page 40)

in existence for such an installation before construction, special research and study were required. *From American Gas Association Monthly, published by American Gas Assoc., New York, N. Y.*

Aesthetic Oil Rig

By use of soundproofing, landscaping, whip-stocking and muffled motors, a drilling rig owned by Universal Consolidated Oil Co. producing 3000 bbls of oil a day, stands in the middle of Beverly Hills, Calif., with the approval of the residents.

Derricks and power units are completely enclosed and insulated with fireproof vinyl plastic cloth 1½ in. thick. Various phases of drilling and production are powered by electricity and the combination of electric drilling and plastic insulation makes operation extremely quiet.



"Prettied up" sound-insulated oil rig stands in middle of residential district

To further reduce noise, cuttings and discarded mud are hauled away from the well in vacuum trucks only in the day time. Drill pipe cannot be taken from the pipe racks after dark. In addition, the surrounding area has been landscaped and is kept attractive. *From The Flowline, published by Rockwell Manufacturing Co., Pittsburgh, Pa.*

Keep That Compressor Dry

Moisture can be troublesome in the operation of your multi-stage compressor, causing excessive wear on valves, cylinders and rings. The service life of these parts is reduced from a normal span of years to months and, under extreme conditions, to weeks.

First important check is on the separator's effectiveness in removing all entrained moisture. Inspection of the suction port and valves of the cylinder after the intercooler tells whether the separator is doing its job of removing the water droplets.

If excessive condensate is carried past the separator, pools of water and some lubricating oil

(Continued on page 44)

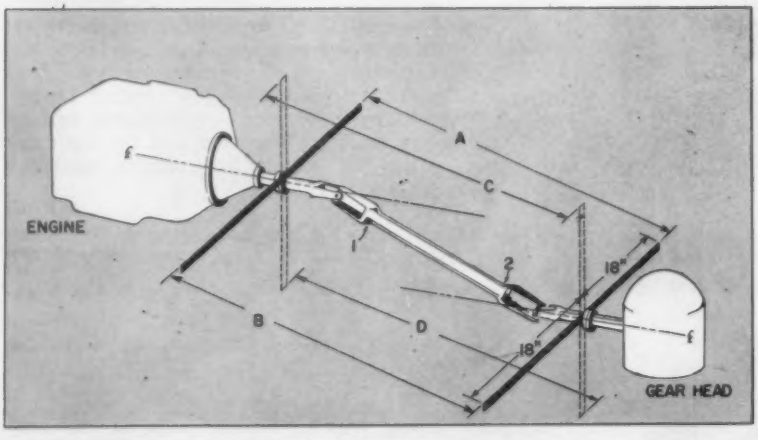
Proper Installation of Universal Joints—a Suggested Procedure

Of primary importance in making universal joint installations, is to make sure that the drive shaft forks lie in the same plane between the power take-off and the driven equipment. This will prevent severe vibrations in the drive shaft.

Next, the centerlines of the power take-off (PTO) shaft and the input shaft of the driven equipment, must be offset within the limits recommended by the maker of the universal joint. This prolongs the life of the joint's needle bearings.

Third important installation requirement is that the centerlines of the PTO shaft and the driven equipment's input shaft must be parallel. This also helps prevent vibrations that cause PTO bearing failures.

To ensure this, use a steel tape measure and two accurate straightedges, each at least 36 in. long. Place the straightedges horizontally along the face of the adapter hubs mounted on the PTO shaft and on the shaft of the driven equipment.

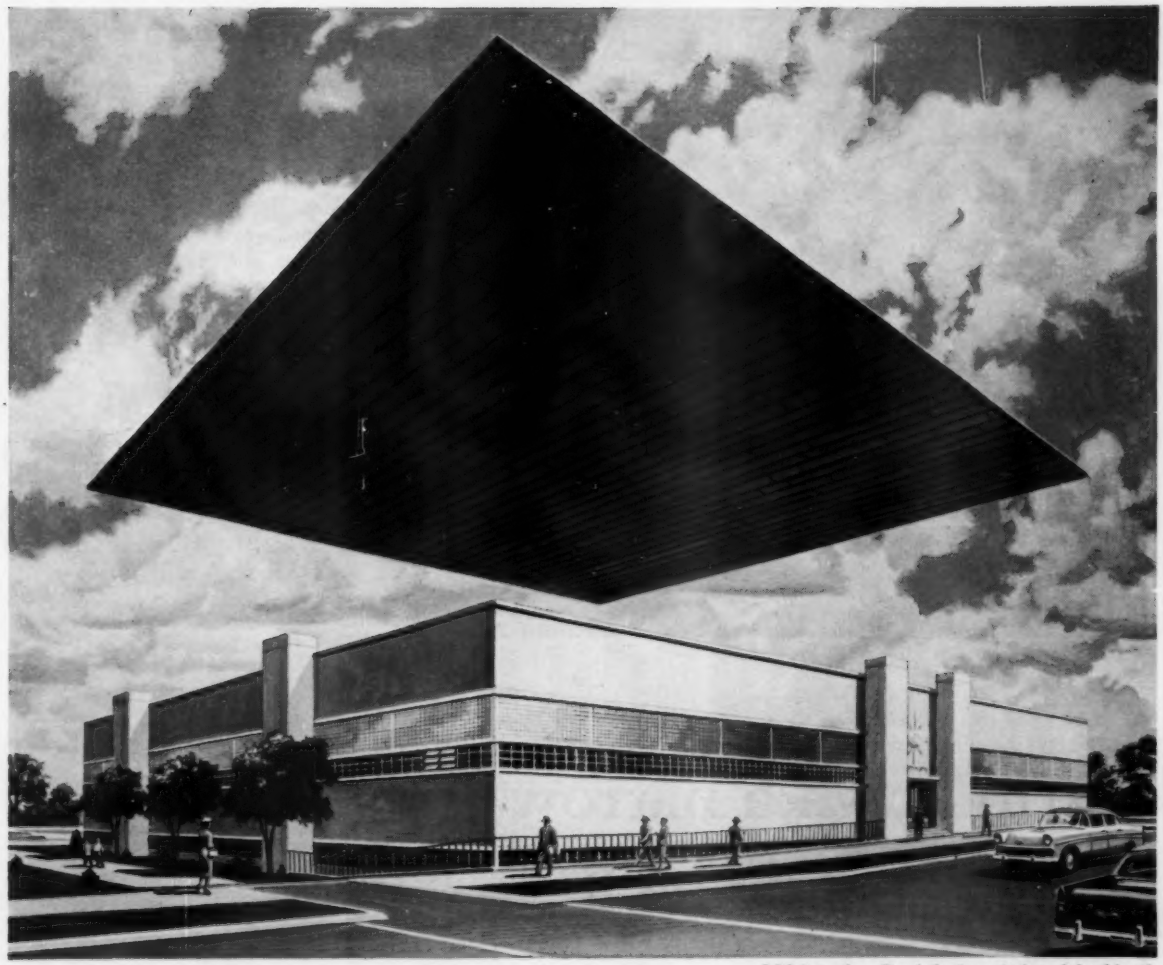


Correct installation of universal joint. Forks 1 and 2 must lie in the same plane

Measure distances A and B shown in the diagram. A and B should be equal within ⅛ in. measured 18 in. from the centerlines of the shafts. If the difference in A and B is greater than ⅛ in. move the engine to bring distances within required limits.

Next, rotate the straightedges to the vertical position shown by dotted lines in the diagram. Distance C should be equal to distance D within ⅛ in. measured 18 in. from the center of the shafts. If C and D vary by more than ⅛ in., move engine to bring distances within required limits.

Repeat this procedure until distances A and B, and C and D are equal to each other within ⅛ in. measured 18 in. from the shaft centers. When finished, securely anchor the engine. The PTO shaft and the input shaft of the driven equipment will now be within one degree of parallel and thus, properly installed. *From Production Road, published by Twin Disc Clutch Co., Racine, Wisconsin.*



J-M Aquadam Roofs for low pitch and dead level roof decks give the best possible protection.

For lasting protection to buildings and contents

Specify Johns-Manville Aquadam® Built-Up Roofs——and be sure

The safety and protection of your equipment and the building itself depends upon the roof. A good roof is vital for keeping out beating rain, melting snow and ice. J-M Aquadam roofs do more than meet these weatherproofing requirements.

Johns-Manville Aquadam Built-Up Roofs owe their weatherproofing superiority to Aquadam, the modern cementing agent used in the application of felts.

Aquadam's exceptionally high adhesive and permanent bonding properties have twice the ability of typical asphalts to retain initial properties on exposure to the weather.

Of equal importance, a good roof must resist the drying-out action of the sun's heat. Without proper protection from the rays of the sun the roof will fail.

Asbestos felts in Aquadam smooth-surface built-up roofs, gravel or slag on Aquadam rag-felt built-up roofs, protect the underlying waterproofing bitumens from the drying-out action of the sun.

When considering re-roofing or buying a new roof, specify a J-M Aquadam Built-Up Roof. You'll assure your building and its contents of long-lasting protection. Your Approved Johns-Manville Roofing Contractor is listed in the classified section of the telephone directory.

For complete details about Aquadam Built-Up Roofs, write: Johns-Manville, Box 158, New York 16, N. Y. In Canada, write: 565 Lakeshore Road East, Port Credit, Ontario.

JOHNS-MANVILLE JM PRODUCTS **Johns-Manville**

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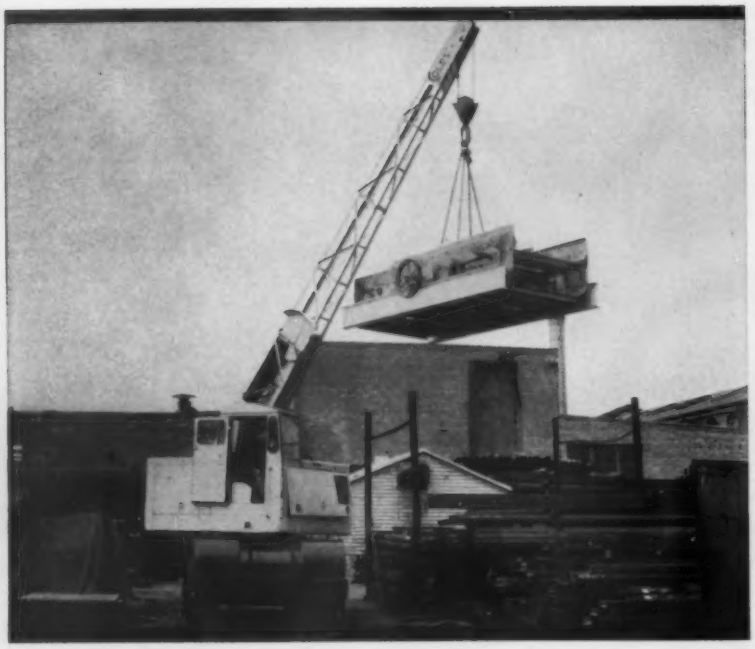

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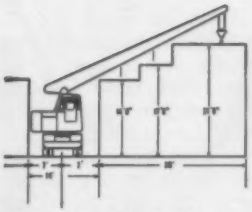

Short, compact chassis, and cantilever boom on high A-frame permits close-quarter maneuverability, high stacking and full use of cubic storage area.

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WRITE FOR BOOKLET "101 Cost-Cutting Ways"

Now, available L. P. G.-, diesel -, or gasoline-electric powered in capacities from 5 to 50 tons. Available on long term lease arrangements.

For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

from the first stage cylinder are evident in the port. Valves have a pitted or sand-blasted appearance and the seat and the guard show an abnormal rate of wear.

If the separator is working properly, the automatic drain trap may not be draining water accumulated in the separator.

With both the separator and the trap working properly, air entering the next cylinder is free of entrained moisture. Since the air is at 100 per cent relative humidity, if the air temperature is reduced, condensate forms.

To avoid these difficulties, maintain cooling water temperature in the compressors' cylinders at least 10 F to 15 F warmer than incoming air or gas. This will prevent condensation of moisture when the saturated air hits the water-jacketed wall of the cylinder. If cooling water is not warm enough, it may be necessary to pipe it in series so that it goes first to the intercooler, then to the first stage and finally to the second-stage jacket.

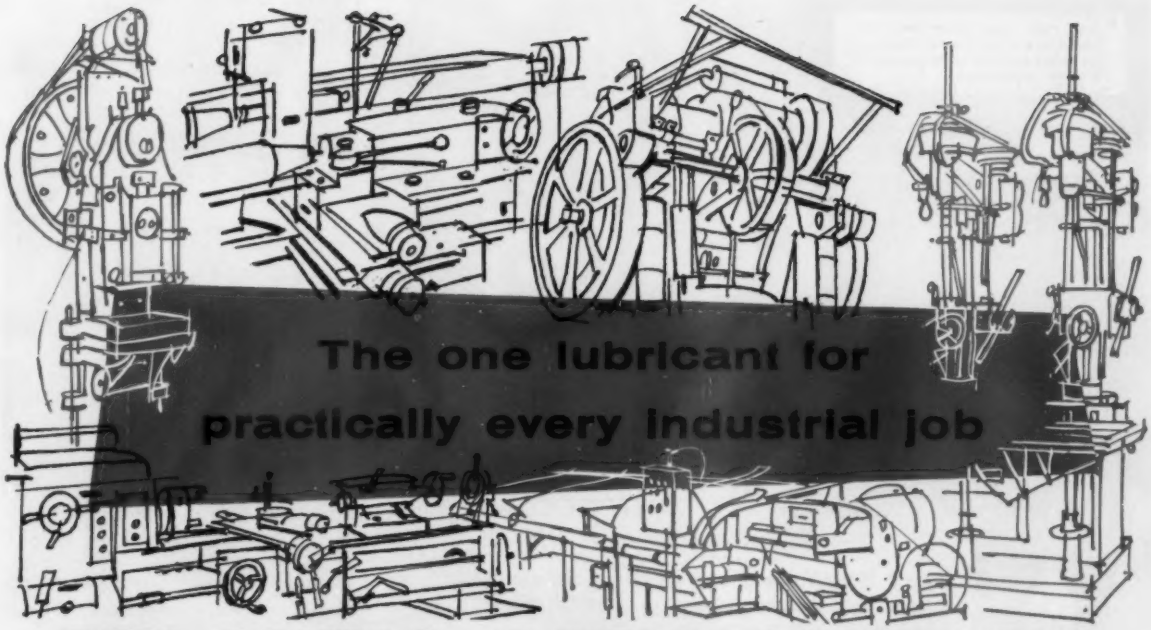
Corrosive gases can be handled successfully in a compressor when gas temperatures are maintained above the dew point.

Should a moisture condition persist, it is a good policy to use a compounded oil in the cylinder. This oil will mix with water and provide a lubricant that will reduce the rate of wear. *From Power and Fluids, published by Worthington Corporation, Harrison, N. J.*

Air Removes Concrete Forms

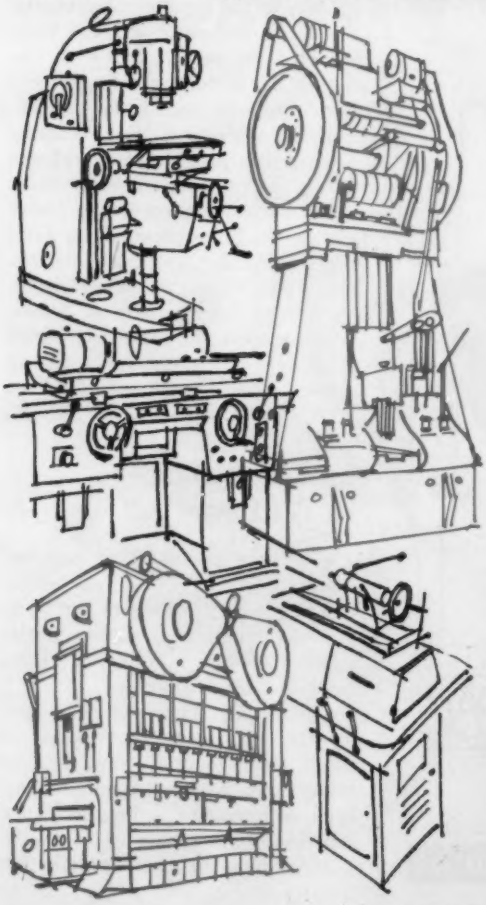
USUAL METHOD of releasing pan forms used in constructing waffle-type reinforced concrete floors, is to pry them loose with crowbars after the concrete has hardened. The use of special dome-like forms that can be removed by a blast from an air gun, eliminates this method, at the same time protecting the surface of the concrete from chips and scratches.

A small hole in the center of each form is capped with a seal before the



ATLANTIC LUBRICANT 54

Performs on all types of grease-lubricated machinery • Cuts cost • Reduces lubricating errors



Atlantic Lubricant 54—an outstanding multi-purpose lubricant—assures:

- **Wider application**—almost universal application to grease-lubricated equipment in plants of all sizes
- **Excellent performance** at very high to extremely low operating temperatures
- **Reduced losses** from lubricating error
- **Lower costs** of warehousing and handling
- **Outstanding rust protection** for all ferrous surfaces
- **Unusual stability** against oxidation and softening—even under very rugged conditions
- **Easy, positive identification**—thanks to Atlantic Lubricant 54's distinctive purple color

Available from conveniently located warehouses. Call any of the Atlantic offices listed below.

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For more facts circle 529 on Reply Card

DAY "AC" Dust Filter and DAY Dual-Clone in the Stauffer Chemical Company fertilizer plant located in Tacoma, Washington

THIS DAY DUST CONTROL EQUIPMENT CERTAINLY SOLVED OUR DUST PROBLEM!

DAY Supplies Dust Control Equipment for Practically Any Industrial Need

The DAY "AC" dust filter* (shown above) captures submicron particles with 99.99+% filtering efficiency. This filter is used in many plants throughout the United States and Canada and handles a wide variety of materials including aluminum, cement, chemical, food, pharmaceutical, porcelain, radioactive, rubber and many other dusts.

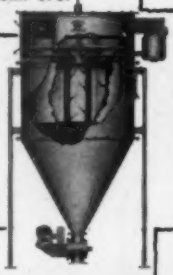
The DAY Dual-Clone (above-right) has low horsepower requirements and operates with unusually low back pressure. It requires no maintenance.

For latest information about DAY "AC" and Dual-Clone equipment write toDAY for Bulletins 559 and 49-DC.

*Licensed by H. J. Hersey, Jr.

DAY TYPE "HV" CYCLONIC SEPARATOR

A heavy gauge, welded, high efficiency cyclonic separator. The DAY "HV" has a wide range of applications. It handles abrasive or high temperature dust laden air and requires no maintenance because it has no moving parts. Available for pressure or vacuum operation. For additional information write for Bulletin 576.



DAY TYPE "RJ" DUST FILTER*

A packaged dust filter shipped completely assembled and ready to run. Provides high performance, top efficiency dust control at low cost. High air-to-cloth ratios give extra air handling capacity in small area. Furnished with or without dust fan and discharge equipment. For latest information write toDAY for Bulletin 560.

*Hersey and DAY patents applied for.

DAY TYPE "G" EXHAUST FANS

High air delivery per horsepower required. These fans are designed specifically for dust control applications. Each fan is statically and dynamically balanced before shipment. For further information write toDAY for Bulletin 471.

DAY SINCE 1881

The **DAY** *Company*

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STOP AIR POLLUTION with **DAY** DUST CONTROL

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

Form is removed from hardened reinforced concrete floor by blast of air

form is put into place, to create a plenum chamber necessary for the removal of the form by air pressure. The forms are nailed, through holes provided in each corner of the flanges, to wooden planks to hold them firmly in place while the concrete is poured. A firm walking space is also provided for workmen during placement of the reinforcing.

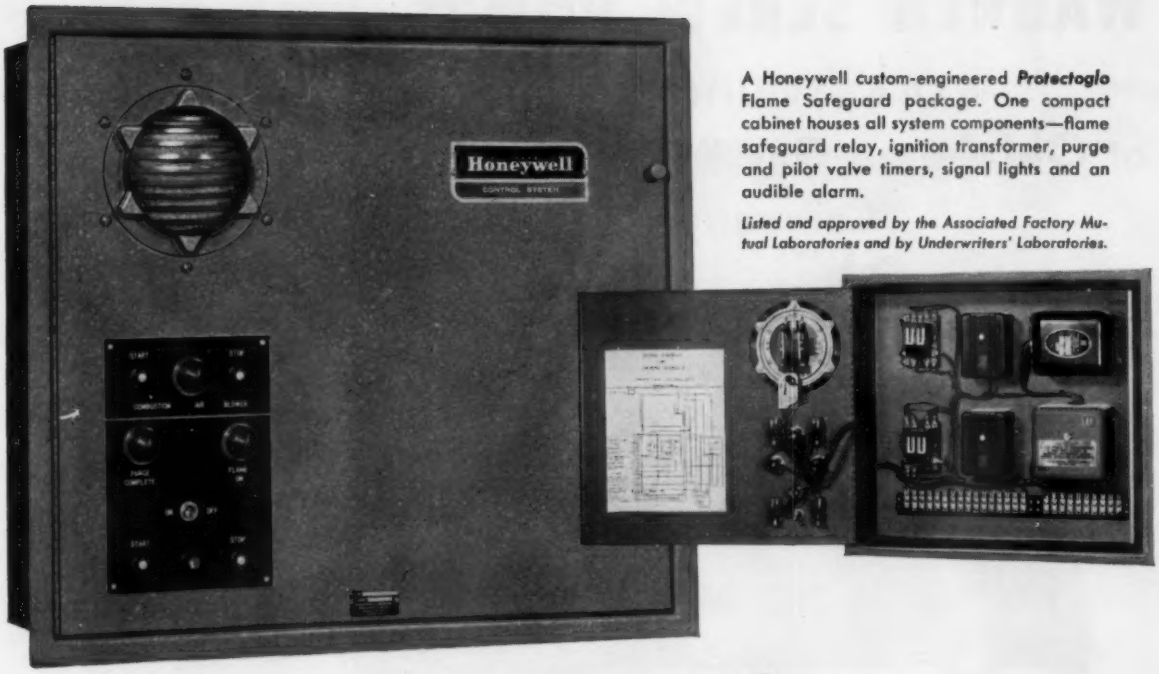
Use of the one-piece domes makes it possible to construct open floor areas with no projecting beams. Flanges forming standard-width soffits are an integral part of domes. When erected, the forms are butted at all soffit joints, creating a smooth surface. *From a release of Ceco Steel Products Corp., Chicago, Ill.*

Warm Oil No Problem For This Conveyor Belt

CONVEYOR BELTS, 120 ft long, become bathed in warm oil when carrying corn chips from the oven area to the packaging stations at the Frito Company-Western Div., plant in Los Angeles.

Conventional conveyor belts used for the job had to be replaced in about three months' time, but by changing to Koroseal food handling belts, maintenance savings of 50 per cent have been realized.

Mechanical fasteners remain se-

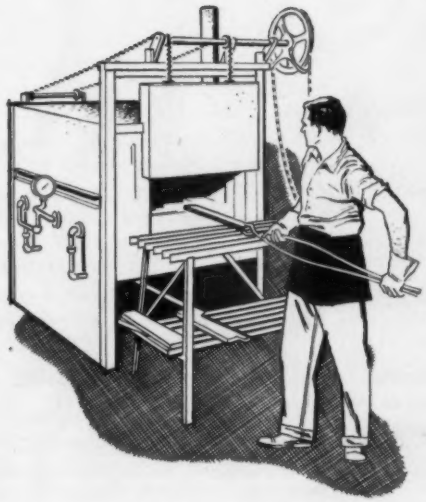


A Honeywell custom-engineered ***Protectoglo*** Flame Safeguard package. One compact cabinet houses all system components—flame safeguard relay, ignition transformer, purge and pilot valve timers, signal lights and an audible alarm.

Listed and approved by the Associated Factory Mutual Laboratories and by Underwriters' Laboratories.

Protection against...

- ***Production loss***
- ***Property damage***
- ***Personal injuries***



Here's fast, sure flame failure protection for any plant. But more than protection, Honeywell flame safeguard systems offer the convenience of automatic light-off and programming for automatic operation of dryers, ovens, furnaces ... *all* fuel burning equipment.

Flame safeguards prevent the continued flow of unignited fuel into combustion space in event of flame failure or failure of ignition. And they prevent starting the burner before purging has been completed.

Programming variations include: cutoff or relight service; automatic, manual or standing pilot ignition; pre-purge; post purge; immediate or delayed valve opening.

Honeywell flame safeguard systems are designed for oil, gas or dual fired equipment ... simple or complex ... single or multiple-burners. We'll help with planning and startup.

Call your nearby Honeywell field engineer for details. He's as near as your phone.

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WARREN SCREW PUMPS

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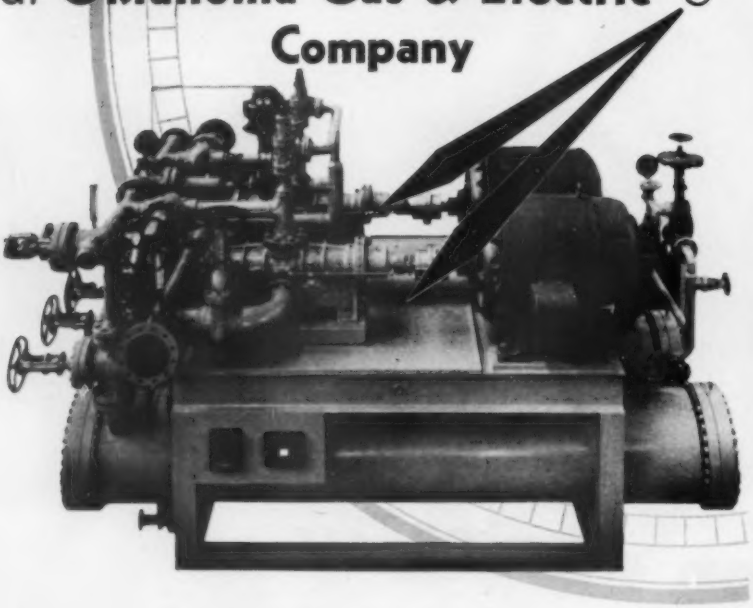


Pumping heavy fuel oil

to the boilers at the RIVERBANK STATION of the Oklahoma Gas & Electric Company is a full-time job for these two Warren Screw Pumps (#5¼ Long Body)

For many months they have been providing 24-hour-a-day service at full efficiency for this important installation:

The heavy fuel is fired in a radiant type boiler with nominal steam capacity of 1,200,000 pounds per hour. The steam-driven turbo generator has a nominal capacity of 170,000 KW, and the turbine operates at 1800 PSIG and 1000°F. at the throttle valve, with reheat to 1000°F.

Operating temperature of the #6 Bunker "C" fuel oil is 100° to 225°F.; capacity is 225 GPM; discharge pressure is 675 PSIG; and using 150 HP—1150 RPM electric motors.

Warren Pumps are most important to the uninterrupted functioning of this installation. Like so many other power companies throughout the country, Oklahoma Gas & Electric Company is completely "sold" on Warren for long, dependable pumping service.

WRITE FOR BULLETINS S205 AND S206

WARREN

CENTRIFUGAL · SCREW · RECIPROCATING · ROTEX

WARREN PUMPS, INC.

WARREN, MASSACHUSETTS

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

curely locked in the belts and do not pull out as in oil-saturated belts, and, since they can be cleaned with a damp cloth and detergent, cleaning is no longer a problem.

The installation called for two supply belts 120 ft long, 36 in. wide, with three-ply construction. The supply belts travel overhead at a

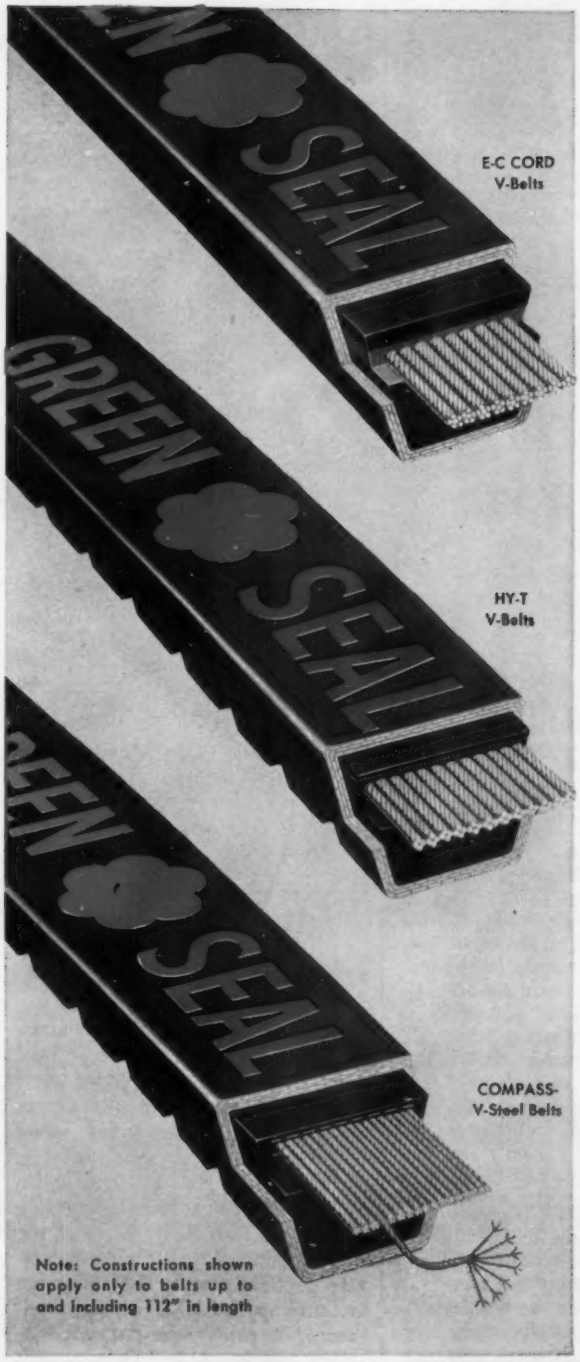
Conveyor belt not troubled by warm oil from cooked corn chips carried on belt

speed of 30 fpm, conveying the corn chips from oven area to various packaging stations. Twenty-four additional belts, each 10 ft long and 24 in. wide, are employed as feeder belts to convey the corn chips from the supply belts to the packaging machines. Final step in the belt system carries packages through a heat-sealing process. This is accomplished on eight packaging belts, 30 ft long, 6 in. wide, which are installed at packaging stations. *From a release of B. F. Goodrich Co., Akron, Ohio.*

Cake Mixing With Compressed Air

Use of compressed air has enabled Maier's Bakery, Reading, Pa., to mix lighter, more uniform cake batter at half again the rate of production formerly possible. In addition, the same air transports the finished batter from the mixing department to the cake depositor some 30 to 35 ft away.

The air pressure, developed by a 1 hp compressor, is applied in a



Why V-Belts with the Green Seal ?

The Green Seal is put on each Goodyear multiple V-Belt for *your* protection. For it's your sign of a belt with dimensional stability—something long sought but only recently achieved in a complete line of V-belts.

What does dimensional stability mean to you? It means belt length remains the same from factory to drive. The length you order is the length you get. Matched sets stay matched. And mismatching — the biggest problem in belting multiple drives — is now a thing of the past.

How was this dimensional stability achieved? Until recently, stable belt length was possible only with steel cable load carriers as developed by Goodyear. But now it is also accomplished with synthetic cord through the exclusive Triple-Tempered 3-T process that stabilizes length by careful tempering with Tension, Temperature and Time.

Triple-Tempering also gives you a stronger, more shock- and stretch-resistant belt. Add "balanced construction" — with each component of the belt designed to its job—and you have a smoother-, longer-running belt which means maximum, trouble-free horsepower hours at minimum cost.

DIMENSIONALLY STABLE V-BELTS
with the GREEN SEAL by

GOODYEAR

THE GREATEST NAME IN RUBBER

The Goodyear Tire & Rubber Company, Dept. 794, Akron 16, Ohio

Please send me more information about how V-Belts with the Green Seal solve the major problem in belting multiple V-belt drives.

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Compass, E-C Cord, Hy-T, Green Seal—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

For more facts circle 533 on Reply Card

At last, authoritative research shows the way to

Predict and Reduce Fan Noise!

DeBothezat now offers this new 50 page book on noise control ... anyone can use it to predict and reduce ventilating fan noise in every installation.

YOU NEED this new book, "Controlling Ventilation Noises," if you ever have *anything* to do with specifying or installing fans. This book simplifies the unfamiliar, specialized terminology of the acoustical engineer — as well as the methods for solving noise problems — so that the entire data can be put to practical use in the plant. It covers installations indoors as well as outdoors.

This data is entirely new. Nothing like it has ever before been available to the industry. The book is a result of noise control research recently completed by the acoustics staff of the Armour Research Foundation of Illinois Institute of Technology.

To supplement the research performed at Armour Research Foundation, which was sponsored by the DeBothezat Fans Division, DeBothezat has constructed its own noise-evaluation laboratories. These include reverberation rooms designed and calibrated for DeBothezat by Armour.

The entire noise evaluation project was sponsored by DeBothezat as a contribution to industry. It was accomplished at a cost of over $20,000 including the research at Armour and the facilities installed in DeBothezat's laboratories.

DeBothezat Centrifugal Roof Ventilator undergoing standard noise source calibration tests at Armour Research Foundation's acoustical laboratories.

DeBothezat's facilities are now being used (1) to *obtain* accurate sound-output data on fan units, (2) to *develop* new fans with lower noise levels, and (3) to allow *publishing* of reliable sound-output data. In fact, DeBothezat fans are now rated for noise on both the inlet and outlet sides. These ratings are expressed in decibels and give the average sound pressure levels in each of 8 octave bands of frequencies, measured separately. This information is available on *all* DeBothezat fan units. They are the only fan units in the industry so rated.

The helpful 50-page book "Controlling Ventilation Noises," is available for just $2.00 prepaid to help defray costs of printing and handling. With it, anyone can predict and reduce ventilating fan noise in every installation. Request your copy of this 50-page book on your business letterhead and attach check or two one-dollar bills.

Exterior view air outlet end of DeBothezat noise evaluation reverberation test rooms. Mock-up engine cooling test equipment in the foreground.

De Bothezat FANS

A DIVISION OF

American Machine and Metals, Inc.

Dept. PE-957, EAST MOLINE, ILLINOIS

IN CANADA: Represented by DOUGLAS ENGINEERING CO., Ltd., Toronto • Montreal

For more facts circle 534 on Reply Card

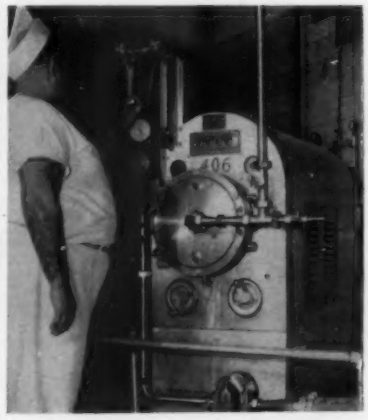
PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

continuous automatic mixer. It is injected into the batter just before it enters the head of the machine in the form of a lumpy sludge.

Using a manually controlled valve on the machine, the baker in charge applies anywhere from 12 psi to 65 psi depending on the type of cake.

Prior to installation of the automatic mixer and compressor, the bakery worked its batter in four small vertical mixers. With these machines, the department was able to mix a maximum of 824 lb of batter per hour. The new equipment, replacing the four vertical



Operator regulates pressure of incoming air at mixer according to type of batter

units, mixes up to 1250 lb per hour.

Back pressure from the air in the head pushes the mixed batter through a 1½-in. stainless steel pipe to the cake depositor. This is an overhead pipe that extends varying distances of 30 to 35 ft. A regulating valve is set to adjust the back pressure to the batter. The minimum pressure applied is 40 psi, the maximum, 100 psi.

The compressor, a two-stage unit with a 200 psi pressure rating and equipped with intercooler, is in a central location in the basement. It supplies air through a 125-ft air line hooked up to the automatic mixer on the main first floor level. Nothing more than routine maintenance has been required on the compressor since it was installed a year ago. *From a release of Ingersoll-Rand Co., Phillipsburg, N. J.*

Do you worry about plant expansion wiring costs

WHILE YOU'RE WAITING FOR A TRAIN?

If you're worrying about the costs of a new power distribution system — either in your present building or in that new plant you're planning — here's one way you can cut down on the worrying. Just specify Rockbestos A.V.C. (asbestos, varnished cambric insulated*) Interlocked Armored Cable. It will not only assure you of dependable service but will help you cut costs several ways. Here's how:

- Rockbestos A.V.C. Interlocked Armored Cable eliminates the need for costly conduits or ducts — it's easily installed on racks or hangers.
- Less layout time — less installation time mean important dollar savings.
- It permits planning for future installations — again at minimum cost.

Add to these direct cost-cutting advantages the long range economy of using a cable that gives you high current carrying capacity, that keeps maintenance at an absolute minimum and you can see the big savings possible when you specify and use Rockbestos A.V.C. Interlocked Armored Cable.

Get full details on dollar saving Rockbestos A.V.C. Interlocked Armored Cable — write now for complete specification and application data.

*Single conductors are N.E.C. type AVA

ROCKBESTOS PRODUCTS CORPORATION

NEW HAVEN 4, CONNECTICUT | NEW YORK, CLEVELAND, CHICAGO, PITTSBURGH, LOS ANGELES, DETROIT, ST. LOUIS, ATLANTA, DALLAS, OAKLAND, SEATTLE

ROCKBESTOS

A. V. C. Interlocked Armored Cable

For New Buildings, Expanding Existing Circuits, Relocating Old Circuits

For more facts circle 535 on Reply Card

"Let's back-up production forecasts with...

5 steps for power system protection!"

Perhaps in your plant too, all the angles have been figured to forecast sales and production growth . . . *except electrical system planning!* But how often have you heard "any addition of machinery here would overload our distribution system." Or — "we have to shut down this department to make electrical repairs."

When 63% of the plants in the country have questionable breaker interrupting capacity, you can't afford the risk of not surveying electrical adequacy as a part of forecasting growth. A single major outage might cost much more in lost production — material spoilage, and possible injury to personnel or equipment. The cost of adequate system protection is nominal, when you consider that a modern power distribution system represents only 5 to 15% of the total plant investment.

Take these steps to protect growth forecasts by pinning down electrical system safety. Your local Westinghouse sales engineer will be glad to help.

STEP 1 Project total connected load for at least 5 years.

STEP 2 Determine percent of transformer capacity in use today — needed in 5 years.

STEP 3 Check main circuit breaker adequacy for faults today — in 5 years.

STEP 4 Plot the balance of load on primary and secondary feeders, for today — for next 5 years.

STEP 5 Rate feeder circuit-breaker protection, for today, and next 5 years.

YOU CAN BE SURE...IF IT'S

Westinghouse

There's profit in planned power ⟶

POWER-UP with Westinghouse...

guard production and personnel with this proof of long range safety

DESIGN TESTED AND VERIFIED in the Westinghouse HIGH POWER LABORATORY

You'll find proof of long range safety is a key to gaining acceptance for your electrical growth plans. Westinghouse engineers help you provide such proof in two ways; 1) extensive apparatus testing, and 2) experienced electrical system counseling.

At Westinghouse High Voltage Testing Laboratory (above) equipment designs are thoroughly checked for both mechanical functioning and maximum electrical capacity. Thus you can be sure that maximum fault current ratings for vital main breakers, for example, have been accurately determined . . . not guessed at.

Selecting the proper electrical distribution system is most important, as it sets the pattern for your power planning. Years of counseling with all types of companies enables Westinghouse engineers to help you consider all the facts and coordinate equipment for an efficient, flexible plan. There's profit in planned power — particularly if its Westinghouse.

MP-3055

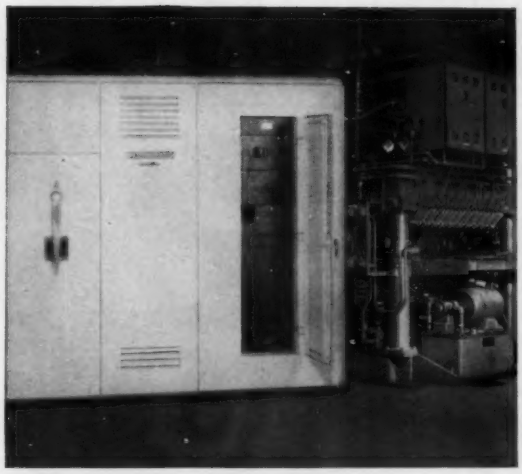
Characteristics of Distribution Systems

TYPE OF SYSTEM	Flexibility	Service Continuity	Regulation	Efficiency	Operation and Maintenance Cost	Initial Investment
Modern Simple Radial	F	F	D	C	A	A
Primary-Selective Radial	D	D	D	B	A	B
Simple Network	A	A	A	C	B	E
Simple Spot Network	C	A	A	D	D	E
Primary-Selective Network	A	A	B	A	C	D

LEGEND			
A...91-100%	C...71-80%	E...51-60%
B...81-90%	D...61-70%	F...41-50%

Approximate relative standing of five basic distribution systems. For detailed analysis of your system, consult your Westinghouse salesman.

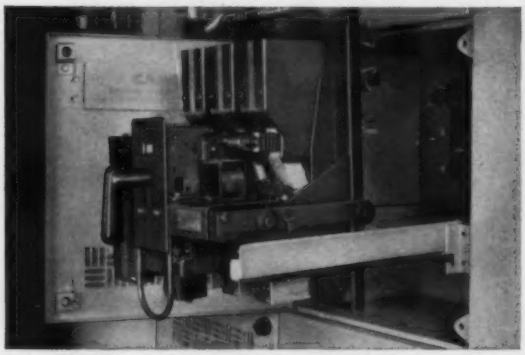
YOU CAN BE SURE...IF IT'S Westinghouse



With Westinghouse dry-type power centers you can bring the economy of hi-voltage into production spaces with full safety. They're 25-40% lighter than liquid filled, eliminate fire hazards, easily mounted overhead.

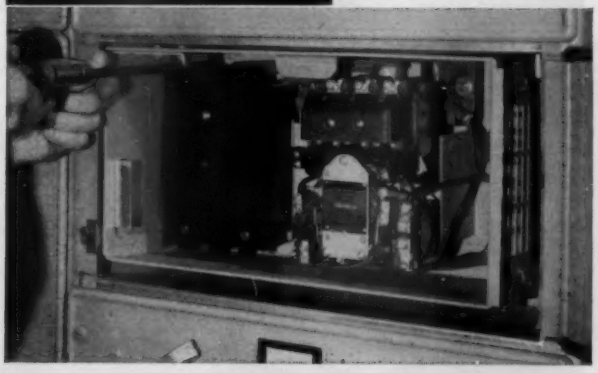
In Westinghouse standardized metal-clad switchgear design, you'll find complete personnel safety in operating and servicing. DH De-ion* breakers draw out horizontally, quickly and easily, thus facilitating inspection and maintenance. Breaker units in the same voltage classes and ratings are interchangeable.

*Trade Mark



Westinghouse low voltage DB circuit breakers, in a complete line of ratings, provide maximum protection in less space. They contain a multi-purpose tripping device to prevent false shutdowns. It provides 1) delayed tripping on temporary overloads, 2) trips on larger overloads. 3) trips instantly on short circuits.

New Westinghouse Control Center featuring both 9-¼ and 14 inch modular units, centralizes control and enables faster servicing in the event of an outage . . . provides personnel protection. Neoprene gasketing and rolled edge doors to provide structural strength and protect against dirt and fumes. Tested unit baffling localizes any fault.



New Westinghouse Ampgard* High Voltage Starter coordinates overload, short circuit, and personnel protection on large AC motors up to 3000 hp-4800 volts. BAL fuses provide fault interrupting capacity to 250,000 Kva.

*Trade Mark

For more facts circle 536 on Reply Card

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by Vernon T. Kempf

Preventing Oil Mist Problems

CLEAN AIR IS ESSENTIAL to the operation of Miniature Precision Bearings, Inc., at Keene, New Hampshire, where miniature bearings are manufactured and assembled to close tolerances. Employee health, safety and fire hazards prompted precautionary measures being planned and put into effect where the grinding operations take place.

To achieve an oil-free atmosphere in the area around the grinders, two 2000-cfm Trion oil mist precipitators were installed to accumulate the excess oil mist that lubricates the high frequency grinding wheel heads. Their use has prevented the oily mist being deposited on the floors, walls, lighting fixtures and other equipment. The precipitators prevent slipping accidents since no oil is deposited on the floor, and maintain lighting efficiency because lighting fixtures and walls remain clean without frequent maintenance.

The efficiency of the precipitators permits the return of cleaned air into the shop, reducing make-up air requirements. Due to the proximity of other equipment and personnel the location of the air discharge vent was changed from the back side of the unit to the top.

The oil mist is drawn from the machine operation through ductwork to an inlet adapter where it passes through a mechanical prefilter and enters a high voltage screen. Here all mist and smoke particles, even of submicroscopic size, receive a positive electrical charge. These particles are then attracted and adhere to collecting plates, which form the negative elements of an electrostatic field.

The electrostatic field is set up between a series of parallel plates, charged alternately positive and negative. The droplets collect on the plates and as the accumulation builds up, the oil drops off into a collecting basin for ultimate reuse.

Template File Saves Time, Space

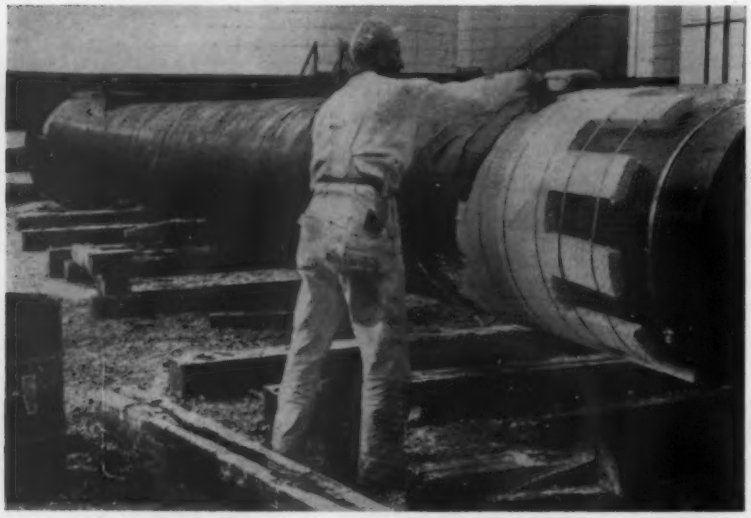
SAVING 100 PER CENT in floor space and considerable decrease in labor costs resulted when a template file was installed recently by Westinghouse Electric Corporation's Motor and Control Division in Buffalo, N. Y.

Panels slide in and out on rollers for easy access to any template in the rack

Templa-File, manufactured by the DeLuxe Metal Furniture Company, Warren, Pa., has a storage capacity of almost 3000 sq ft and occupies less than 25 ft of floor space. The use of the file has effected substantial labor savings by eliminating lost time which was formerly spent looking for templates. When you take into account the additional time needed to make duplicate templates lost due to improper storage facilities, this savings is multiplied.

The file keeps all materials off the floor and has improved template handling considerably. It is easy to use and the self-contained reference desk and card file makes record keeping of templates simple.

Cost Cutting Insulation Technique on Smoke Stack



Set up on blocks this smoke stack was insulated on the ground prior to erection. The magnesia blocks are held by stainless steel bands placed one foot apart. Poultry wire serves as lath for the cold applied asphaltic protective material. After curing, the stack was lifted at the top by a crane and set on the foundation

Fast Starter Testing

Contributed by H. Muller

SHOP-BUILT TESTER speeds up the task of testing suspected fluorescent starters. To build the tester, a standard socket with a small lamp and a fluorescent starter socket are mounted on a wooden base; the two sockets are wired in series with a line cord.

Thermal starters have a normally-closed circuit to furnish the preheat current to the cathodes of the fluorescent lamp. This circuit opens after a short interval. A good starter will light the lamp for a short inter-

QUICK! *"Call the Deluxe Dealer— we have a shelving problem!"*

This poor fellow hasn't a place for everything and everything in its place. Matter of fact, there seems to be a place for nothing. Your shelving problems can't possibly be this preposterous, but if you want to talk about them with an expert call your Deluxe Steel Shelving dealer. He's nearby, ready to give you on-the-spot shelving layout service. He will engineer efficient, flexible shelving installations and supply you with additional shelving racks as fast as you need them. Deluxe dealers are backed by the finest designed and sturdiest built shelving.

These Deluxe features allow you to install Deluxe shelving at lowest cost.

1. One-piece bin type uprights—for greater rigidity, faster erection.
2. Boltless adjustable shelf brackets—complete adjustability without tools.
3. Snap-in dividers—for quick flexibility.
4. Factory-embedded shelf reinforcing—to cut down installation time
5. Coped shelf corners increase storage capacity.

DELUXE
STEEL SHELVING

DELUXE METAL FURNITURE COMPANY · WARREN, PA.

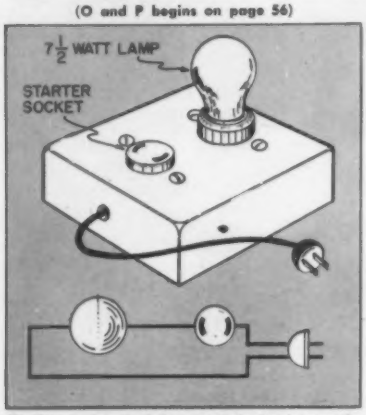
A Division of the Royal Metal Manufacturing Company

Look for your Deluxe dealer under *Shelving* in the yellow pages of your telephone directory or write to the factory for the name of the dealer nearest you and the colorful "Shelving Reference Manual."

For more facts circle 537 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 56)



Series connected lamp and starter socket provides inexpensive method of testing fluorescent starters in the shop

val and then the lamp will go out indicating the thermal element in the starter has operated. This is normal, and indicates a good starter.

A defective starter could be shorted, in which case the lamp will stay illuminated; or, it could have an open circuit and not light the lamp at all.

Rack Coating Prevents Scratches

RACKS COATED WITH plastisol compound prevent jet burner assemblies from being scratched at Pratt & Whitney Aircraft, Hartford, Conn. Parts of the assemblies are precision machined and polished and the smallest scratch on any surface requires that the entire assembly be scrapped. The resilient plastisol coating protects the parts as they are put on and taken from the racks and while the racks are transported from one operation to the next.

The racks are spray coated with a Unichrome plastisol made by Metal & Thermit Corporation. Several coatings build up thickness to 80 mils, providing protection for extended periods. Tanks in the plating department are also coated with this material.

Acetylene Gas Hazards

SAFETY INSTRUCTIONS should be followed in using oxygen-acetylene equipment. The Bureau of Ships Manual specifically states that acetylene must not be used at pressures higher than 15 psi.

A red band signifying danger should be placed inside the glass cover of the acetylene gage starting at the numerals indicating 15 psi and continuing to the 30 psi pressure mark. If acetylene is used from cylinders, the pressure should not be great enough to force the needle in the gage to enter the red danger area.

If adequate heat is not obtained at the torch at 15 psi, the proper torch is not being used. In this case, the acetylene pressure should not be raised, but the correct size torch should be obtained.

Acetylene is an unstable gas. Pressure of 25 to 30 psi in an acetylene hose can, in itself, cause an explosion. Under certain conditions,

(Continued on page 60)

One-Man Rig Unloads Hopper Cars, Loads Trucks and Bins

Contributed by H. J. Miller

HOPPER CARS ARE UNLOADED by dumping onto an elevating conveyor located in a pit below the tracks. This conveyor, in turn, transfers the material to another conveyor that can be readily moved to discharge the material into any one of several bins.

The distributing conveyor is pivoted at its lower end and is supported at the outer end by two pneumatic-tired wheels running on a circular concrete wall. One man can readily move the boom, eliminating the need for handling equipment formerly required to change the location of the distributing conveyor.

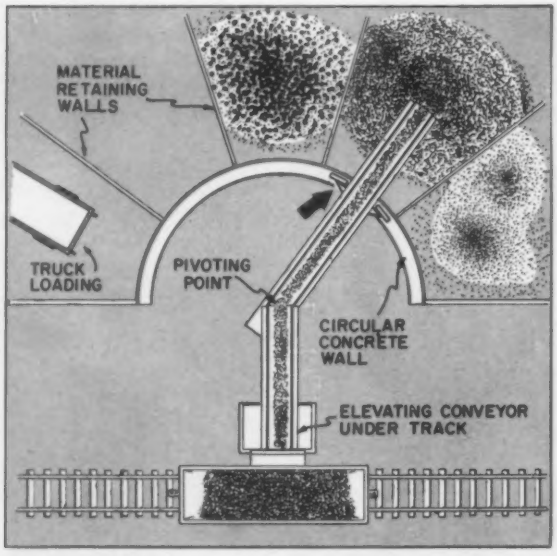
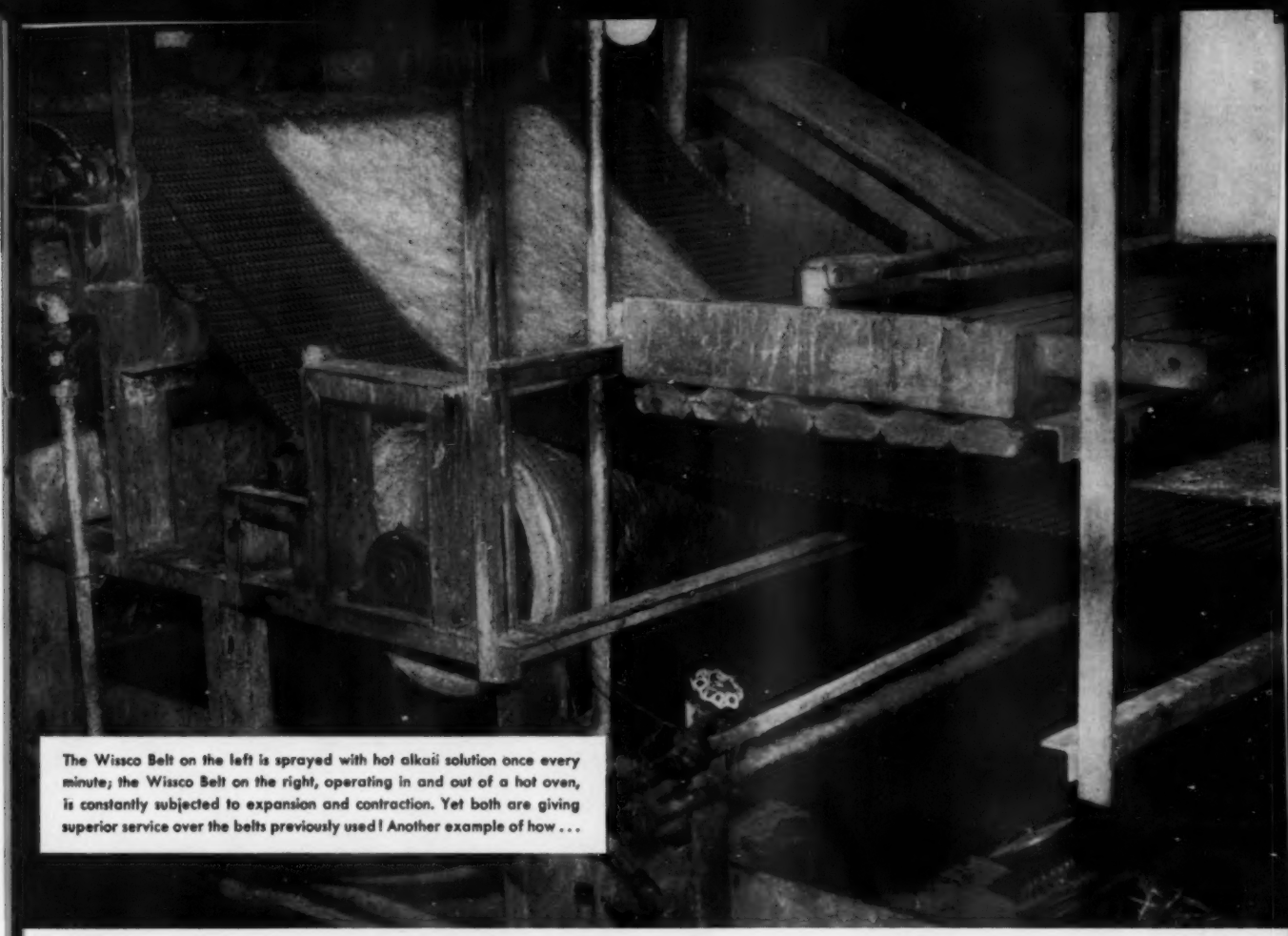


Fig. 1. Several grades of sand and stone can be unloaded and stored in proper bins with this easily-handled conveyor

Fig. 2. One man can readily move the distributing conveyor into position along the semi-circular concrete wall



The Wissco Belt on the left is sprayed with hot alkali solution once every minute; the Wissco Belt on the right, operating in and out of a hot oven, is constantly subjected to expansion and contraction. Yet both are giving superior service over the belts previously used! Another example of how . . .

FAMOUS NAMES

ride on WISSCO BELTS

Ferro Corporation — Fiber Glass Division

The story of Wissco Belts is best told by their users. For instance, Mr. A. B. Paschall, Jr., Plant Engineer of Ferro Corporation's Fiber Glass Division at Nashville, Tennessee, says:

"Our Wissco Belts give double the life of the belts we previously used. What's more, they carry our mats through a 110′ long processing unit with sharp-shooter accuracy."

The belts help process fiber glass mats used to make automobile bodies, boats, ultra-modern furniture and many other items. During their manufacture, the mats pass over four different Wissco Belts; at the end of the operation, the mats must pass exactly between two stationary knives which trim the sides of the mats to the proper width. "A wandering belt would cost us dearly in this operation," Mr. Paschall says. "But our Wissco Belts handle it perfectly."

As for the durability of Wissco Belts, Mr. Paschall has this to say: "Two of our belts are subjected to severe abuse. The 'wet' belt is sprayed with hot alkali solution once every minute. For this, we use a Wissco Belt made of stainless steel. The oven belt is subjected to heat rather than chemical abuse, so we use a Wissco Carbon Steel Belt. We have found that this belt has a satisfactory degree of expansion and contraction, and requires little handling of the take-up mechanism designed to care for slack development.

"Service? Well these Wissco Belts have already been in operation for over three years. But the belts we previously used had to be replaced in a year and a half or less," Mr. Paschall concludes.

Long service life . . . superior accuracy . . . minimum maintenance. Wissco Belts can give you all these important savings, too. Write today for complete details on how you can take best advantage of Wissco Belts in your own normal or high-temperature processing operations.

CF&I WISSCO BELTS

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION — Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION — Atlanta • Boston • Buffalo • Chicago • Detroit
New Orleans • New York • Philadelphia • CF&I OFFICES IN CANADA: Montreal • Toronto

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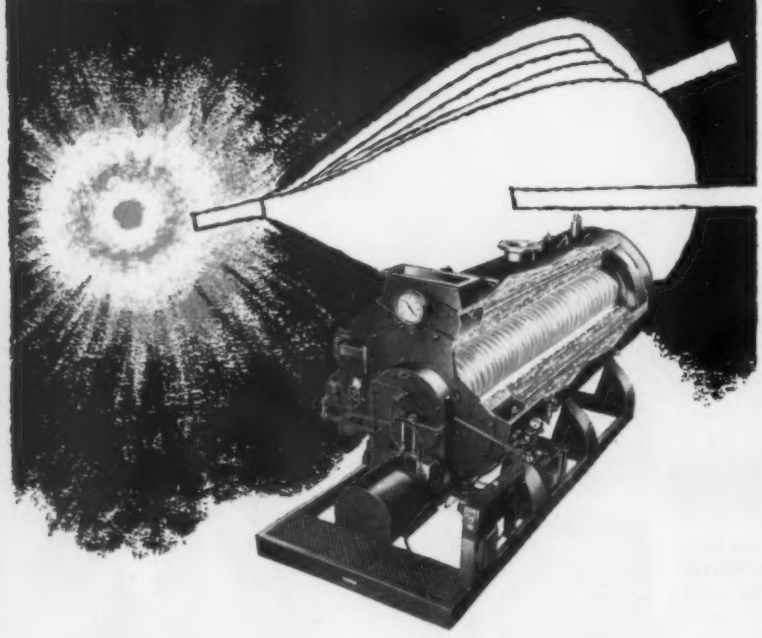
For more facts circle 538on Reply Card

How do you make an ember glow?

Blow on it!



It takes air to promote combustion and when air enters the Cyclotherm combustion chamber at a tangent and with velocity up to 200 mph, really efficient combustion results. The air, assuming cyclonic shape and motion, combines with the fuel to form a flaming vortex spiraling the entire length of the firetube. This Cyclonic Combustion achieves 65% heat transfer efficiency in the firetube alone. An additional 15% is produced in the single pass of return tubes. Cyclotherm guarantees a minimum of 80% efficiency in only two passes.

Cyclotherm also includes an electronic control system for automatic operation. On models up to 60 hp burner automatically shuts off when steam demands are satisfied; resumes when steam is again needed. On larger models, precision modulation automatically regulates firing rate from 30% to 100% without loss of efficiency.

A complete package Steam and Hot Water generator, Cyclotherm is designed, built and assembled by Cyclotherm Division, National-U.S. Radiator Corp., with one manufacturing responsibility behind the entire job. Models 18 to 750 hp; 15 to 200 psi; burns oil and/or gas.

Among additional Cyclotherm advantages are:

- From cold start to full power in 15 to 20 minutes
- No stack—only a simple flue
- Maintenance costs cut 30% to 50%
- No special foundation needed
- A worldwide service organization
- Saves one-third the space required by other package boilers.

YEARS AHEAD IN STEAM GENERATION
CYCLOTHERM®
Steam & Hot Water Generators
Cyclotherm Division,
National—U. S. Radiator Corp.
32 E. First St., Oswego, N. Y.

Clip to your letterhead

Send me your new booklet "Cyclotherm Cyclonic Combustion"

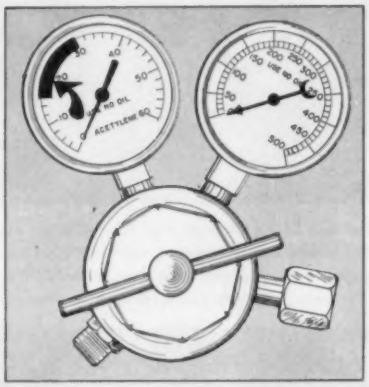
For more facts circle 539 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

acetylene forms violent explosive compounds with copper, silver and mercury. For this reason, pure copper and alloys containing copper in excess of 68 per cent should not be used in piping, fittings, and other devices for handling acetylene.

Acetylene is dissolved in acetone and porous material in cylinders and the proper amount of acetone must be maintained. Cylinders with the correct quantity of acetone are charged with acetylene at 70 F to 250 psi.



Acetylene gage with red band on face to indicate dangerous pressure zone.

Cylinders should be stored and used only in a vertical position. When the cylinder is laid down horizontally, the acetone may move towards the valve and enter the gage and the hose. This practice could cause an explosion by reducing the quantity of acetone under high pressure in the cylinder.

Tubular Railings Easily Made

Contributed by F. E. Riley

BUILDING TUBULAR STRUCTURES often requires a joint in which the tubes form a right angle. The end of the horizontal tube is prepared to fit neatly on the exterior of the vertical tube. Two separate operations are usually needed when preparing the tubes. The first consists of sawing the tube to length and the second, forming the radius in the end of the tube by bandsawing, nibbling or milling.

A standard Black and Decker

They cut out three oils by changing to one...

STANICUT Oil 166 BC

Screw machine plant saves on oil inventory and handling, receives other benefits by converting to dual-purpose cutting oil.

Standard Oil lubrication specialist Bob Cleland and plant manager I. G. Smallegan inspect machined piece. Giving technical help to customers like this is something for which Bob Cleland is well fitted. Bob has a mechanical engineering degree from Michigan State University and has completed the Standard Oil Company Sales Engineering School.

Grand Rapids Metal Products Company's problem was the mixing of cutting and lubricating oils in their National Acme and Gridley screw machines. In all, four oils were used. In some machines a cutting oil, two lubricating oils and a base oil were employed to improve machining characteristics. Lubricating oil leaking past seals mixed with the cutting oil, reducing cutting oil qualities. Oil mixtures were constantly varying, and troubles in tapping resulted.

Standard Oil's Bob Cleland, working with plant management, suggested STANICUT Oil 166 BC. This oil, he explained, is a dual-purpose oil. It can be used for lubrication as well as for cutting. In such applications, no dilution of the cutting oil can occur.

After a week's trial in one machine, the entire plant was converted to STANICUT Oil 166 BC. Tap troubles were reduced, resulting in much less down time. Spindle speeds have been increased, yet the spindles run cool. Four oils were formerly kept in stock. Now only one is needed.

STANICUT Oil 166 BC does not corrode bearings, gears, bushings, spindles or other machine parts. While the oil contains E.P. additives, it does not stain copper or brass.

Get the facts on how STANICUT Oil 166 BC can help you. Call the Standard Oil office nearest you anywhere in 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

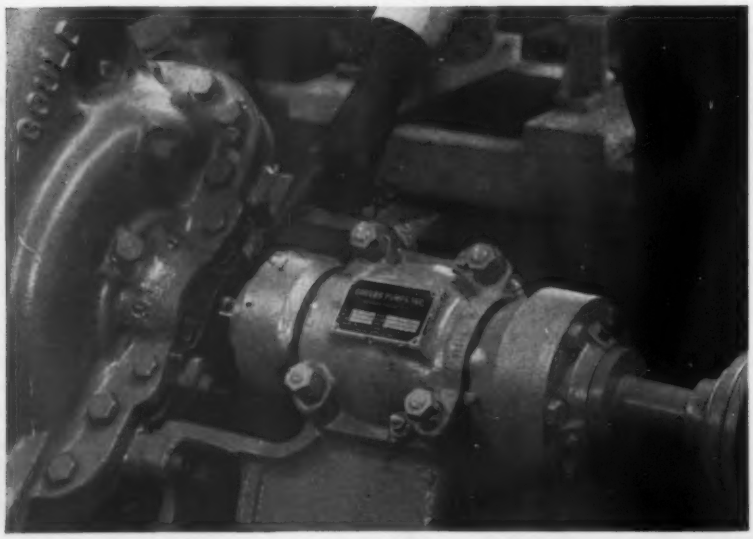
Quick facts about
STANICUT OIL 166 BC

1	A dual-purpose oil — suitable for both cutting and lubrication.
2	Non-corrosive to work or machines.
3	Formulated with E.P. additives.
4	Stable under all normal conditions.
5	Non-irritating.
6	A cutting oil that permits high operating speeds.
7	Non-staining to either copper or brass.

STANDARD

STANDARD OIL COMPANY
(Indiana)

For more facts circle 540 on Reply Card



Pump maintenance more important than ever.

Today good pumps are made of materials suited to their jobs. Many, with fluid ends of new, longer-lived alloys, are built to resist corrosion and abrasion longer—much longer. They probably represent more investment per pump. But they'll pay off. All they need is better mechanical attention to match their longer life.

Good way to keep your pumps running longer.

Use a set of these Goulds Pump Maintenance Record Cards. They make it easy for you to set up regular lubrication-inspection schedules; help you plan pump repairs during normal plant shutdowns; give you an accurate "history" on each pump, as a guide to the best materials of construction for your pumping conditions.

Get your Pump Maintenance Record Cards, free, from your Goulds representative, or write direct.

GOULDS

PUMPS FOR INDUSTRY

GOULDS PUMPS, INC.
Seneca Falls, N. Y., Main Office and Works
BRANCHES
ATLANTA, 15 Peachtree Place, N.W.
BOSTON, Room 314, 1330 Beacon St. Brookline, Mass.
CHICAGO, 53 West Jackson Blvd.
HOUSTON, 2314 Main Street
NEW YORK CITY, Room 1503, 11 Park Place
PHILADELPHIA, 2099 North 63rd Street
PITTSBURGH, Room 512, Bessemer Bldg., 104—6th Street
TULSA, 543 East Apache Street, P. O. Box 6157

West Coast Representative: GOULDS PUMPS Western, Inc., 1919 N.W. Thurman St., Portland 9, Oregon
In Canada: The A. R. Williams Machinery Co., Ltd.... in all principal cities

For more facts circle 541 on Reply Card

OPERATION—PRODUCTION

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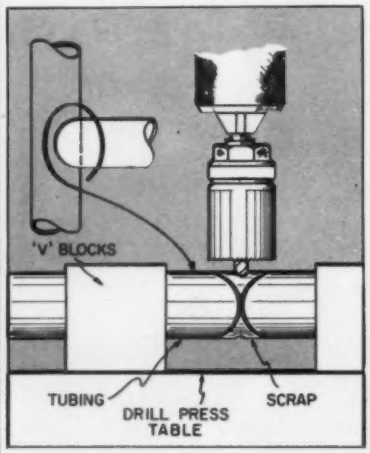


Tubing is clamped in V blocks. Cut produces two radiused ends in one pass

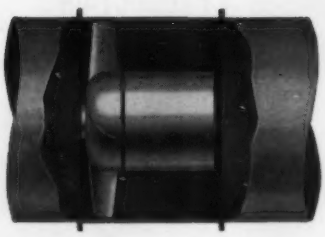
hole cutter can be used in a drill press to perform the task of cutting to length and forming the radius in one operation. It will usually be found that the depth of the internal recess in the cutter is equal to the outside diameter of the toothed portion so that the tube will be severed completely at one downward pass of the drill press spindle.

When laying out drawings for tubular structures in which radiused ends are to be produced, the tube lengths should be specified with reference to the radius center line. This procedure enables the lengths required to be laid off on a length of tube by means of center punch marks which are used for locating the pilot drill of the hole cutter.

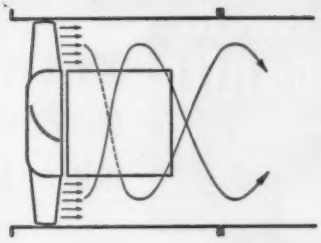
Triplex Pump Cuts Maintenance

EXPENSIVE PUMP maintenance is no longer a problem at Emery Industries, Inc., Cincinnati, Ohio manufacturer of fatty acids, glycerine, plasticizers and other oils and reagents. Cost have been reduced considerably since they installed triplex reciprocating pumps.

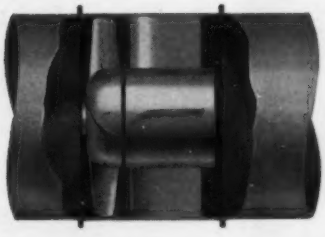
Emery's raw materials include coconut, palm, soybean, cottonseed, and corn oils, and animal fats, tallow and grease from every part of the world. These fatty acids are heated to 200 F and pumped into three 80 ft high hydrolysis columns, where



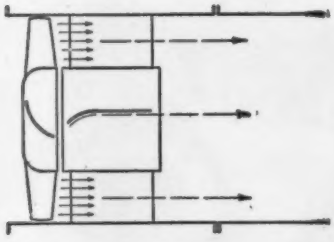
The tubeaxial fan . . . a wide range of volumes at medium pressures, with uniform velocity . . .



. . . at moderate pressures the spiral air discharge straightens out a short distance from fan blades.



The vaneaxial fan . . . stationary guide vanes reduce turbulence and increase fan efficiency . . .



. . . resulting straight-line air flow leaving fan assures smooth, quiet operation for all conditions.

Easy-to-install American Blower axial fans save space, lower your installation cost

Versatile American Blower axial fans can be mounted vertically or horizontally. When ducts are properly reinforced, the fan can be supported directly by the duct connection.

American Blower axial fans provide straight-line air flow, eliminating elbows, bends, and transformation pieces—can be installed vertically or horizontally in ducts, with minimum foundations and supports . . . with savings in space, first cost, handling, and installation.

These compact, self-contained axial fans are available in three general designs—vaneaxial for direct and V-belt drive, spray-booth vaneaxial for V-belt drive, tubeaxial for direct drive. A complete line of accessories is offered to adapt this versatile line of fans to your particular requirements. Capacities range from 2,500 cfm to 75,000 cfm. Larger sizes are available on special order.

For more information on axial fans, or on other equipment from American Blower's complete air-handling and -conditioning line, call our nearest branch office, or write direct to American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

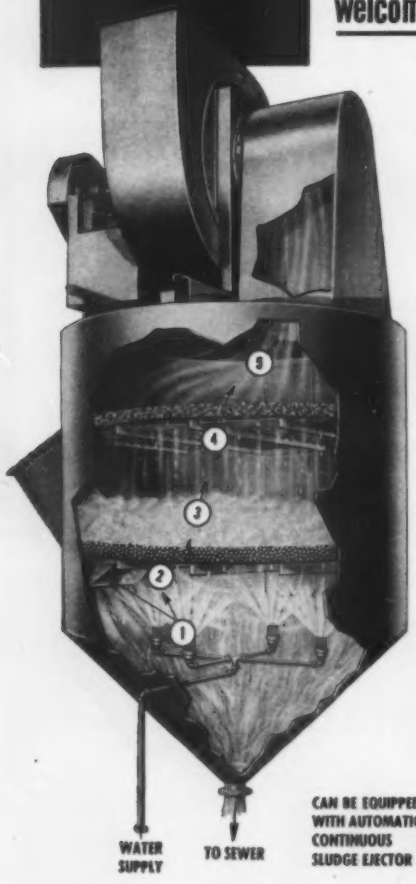
AMERICAN BLOWER

Division of American-Standard

For more facts circle 542 on Reply Card

Here's how the
NATIONAL
HYDRO-FILTER
Works:

Why it combines exceptional efficiency with welcome ease of maintenance



CAN BE EQUIPPED WITH AUTOMATIC CONTINUOUS SLUDGE EJECTOR

1 Large dust particles are thrown out of the air stream as it changes direction upon entering collector. This portion of the dust load is trapped by contact with the wet surfaces of the conical chamber.

2 The air with its remaining dust load starts a torturous, deflective path through the bed packed with glass spheres. Dust is impinged on wetted surfaces and flushed downward continuously.

3 Air is converted to bubbles in pool of violently turbulent water and mist maintained above filter bed. Small dust particles are trapped in water droplets.

4 Air approaches moisture eliminator bed through more mist and droplets. Moisture and micron dusts are entrained on surface of packing media and returned to the bottom of the collector.

5 Clean air is exhausted to atmosphere.

Air, water and glass spheres do the work in Hydro-Filter. There are no moving parts in the collection area—nothing to "load up"—no "dead" areas or "critical" water levels to maintain. The relatively simple design permits economical use of special materials of construction. A complete *continual* flushing of all interior surfaces insures its self-cleaning action.

The Hydro-Filter is designed to maintain *constant high level efficiency* over wide variations in volume of air and dust loads. It is easy to operate and understand. Its simplicity of design has proven ease of maintenance unmatched by *any* equipment for similar use. Write for literature on the National Hydro-Filter *today*.

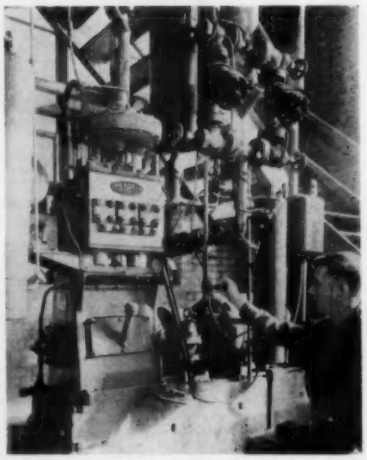
National Dust Collector Corp.

604 Machinery Hall Building • Chicago 6, Illinois

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)



Special materials used in construction of triplex pump lower maintenance costs

they meet a countercurrent stream of hot water at pressures over 700 psi. After nine years of service, the two original Aldrich three-inch triplex pumps are still on the job. Corrosion resistant valves have reduced the need of frequent refacing and wear of the fluid end is minimized because all parts are constructed of stainless alloys.

Rainhat Protects Paper Rolls

RE-USABLE "CANVAS CAPS" provide a cheap, practical and easy method of storing paper rolls out-

Canvas caps slip easily over top of rolls. Bottom edge has grommets for tying

doors. Positive protection against rain, snow, mildew and moisture saves expensive roofed storage. The Hoosier Tarpaulin Company, Indianapolis, designed the special canvas caps that cover the top of the roll.

The covering looks something like a cake cover. It is cylindrical, flat on top, with sides to a depth of a few inches. It is made of water repellent, flame and mildew resistant canvas. Standing snow can melt on the cover without damage to the paper.

Sealless Pump Stops Leaks

PLASTIC PUMPS WITHOUT SEALS are considered an essential link in the patented continuous-flow process

Fig. 1. Pump can be repaired without disturbing base or coupling alignment

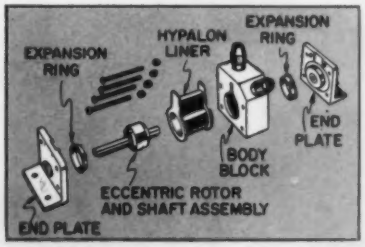
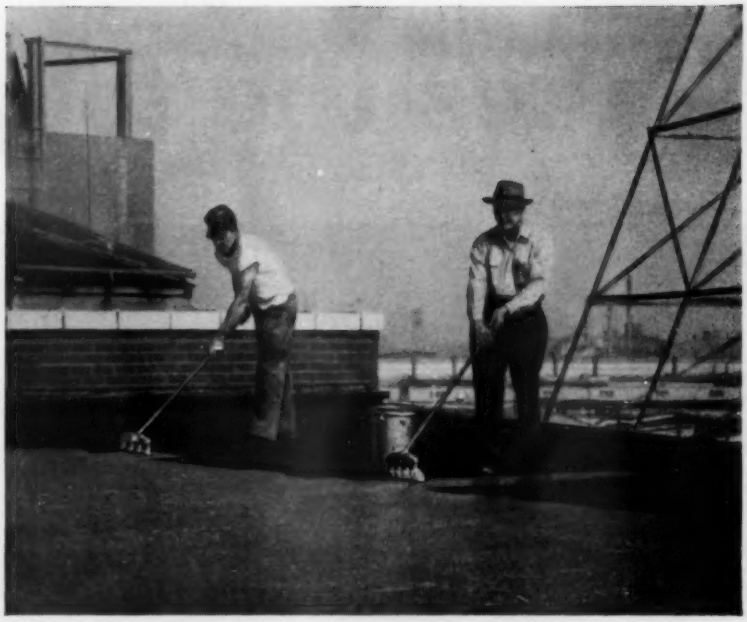


Fig. 2. Minimum parts and simple construction result in less maintenance

used to produce zirconium oxide by the Zirconium Corp. of America in its plant at Solon, Ohio.

Shaft seals and stuffing boxes are eliminated on the pump, made by the Vanton Pump and Equipment Corp., by the use of a flexible liner. Flanges on the liner are pressed to the body block by grooves on the end plate and pedestal, isolating all mechanical parts to the outside of the flexible liner. The slurry is swept between the plastic body block and flexible liner without touching any metal parts.



CUT UPKEEP...

make any roof an Aluminum roof

Any built-up or metal roof can be given a maintenance-free, rust-proof shield of aluminum – easily. All it takes is a coat of asphalt-aluminum roof paint or coating. It will add years to a roof's life, provide metallic protection of roofing material. Your buildings will be up to 15° cooler in summer, air conditioning costs will be cut with aluminum roof coating.

When the coating is applied, tiny flakes of aluminum rise to the surface, and leaf. When it dries, your roof has a new metallic surface, firmly bonded for years. It's like putting a roof over your roof.

Give your roof new life, with asphalt-aluminum roof paint or coating, made with Reynolds Aluminum Pigment. Look for the Warranty Seal—it means at least two full pounds of pure aluminum pigment in every gallon, and an approved vehicle. If you employ a contractor be sure he's reliable and ask him to use aluminum roof paint or coating with Warranty Seal assurance.

Guard Against Rust, Corrosion with Aluminum Paint

Metals and masonry last longer, look better with less maintenance when coated with aluminum paint made with Reynolds Aluminum Pigment. Even one coat can protect against rust and corrosion. Also use it to give your plant the modern look of aluminum—inside and out.

By the makers of Reynolds Wrap

See "CIRCUS BOY," Sundays, NBC-TV. Watch for Reynolds on "DISNEYLAND," ABC-TV.

The Finest Paints Made with Aluminum are made with REYNOLDS ALUMINUM PIGMENT

Reynolds Metals Company
P. O. Box 1800-PL, Louisville 1, Ky.
Please send me details on
☐ Aluminum Roof Coatings ☐ Aluminum Paints
Name_____
Company_____
Address_____
City_____ Zone____ State_____

For more facts circle 544 on Reply Card

Takes the tough jobs.

NEW MAGNETIC DRILL PRESS
with HYDRA-POWER FEED
precise and remote control

..standing on its head!

Mail coupon below for free demonstration of NEW Black & Decker Magnetic Drill Press!

Stable, one-piece power unit, built-in drill point locator insure finest precision!

The new B&D Magnetic Drill Press is so loaded with user-wanted features—that it just has to be seen to be appreciated. To see it at work on your own application, mail coupon below for a free demonstration.

For instance: Its exclusive two-piece construction makes it simple to position the magnet. The built-in drill point locator makes accurate placement effortless. An easy twist of the 1¼" capacity drill press unit locks it in place on the magnet.

And it's there to stay! Extra power magnet clings to ½" and thicker steel with a giant's grip. This new B&D Magnetic Drill Press needs no cool-off period. It's stable in any direction, provides highest accuracy at all times.

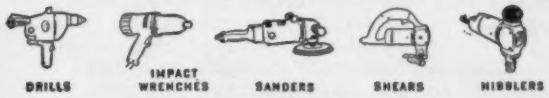
Like the full line of B&D Portable Drills, this new tool is power-packed, quality built. See it for yourself. Mail coupon for free demonstration to THE BLACK & DECKER MFG. CO., Dept. 0809, Towson 4, Md. (In Canada: P.O. Box 278, Brockville, Ont.)

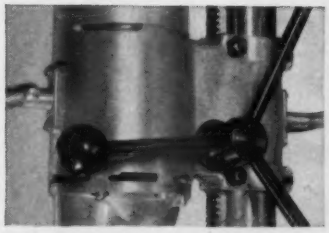
Look Under "TOOLS-ELECTRIC" in Yellow Pages

Leading Distributors Everywhere Sell

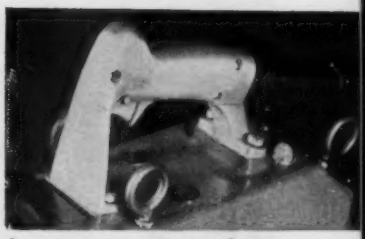
Black & Decker®

Quality Electric Tools—Power-built to set the pace

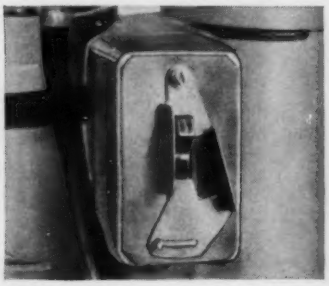




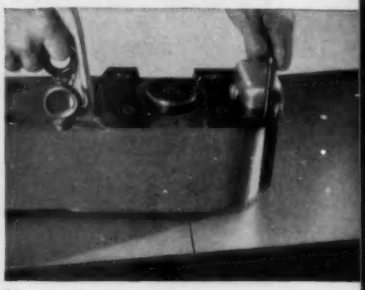
UNITIZED CONSTRUCTION of drill press cannot work loose, no side play, maintains highest accuracy.



SAFETY-GRIP SWITCH keeps magnet always "on" after operator releases switch trigger—another safety plus.

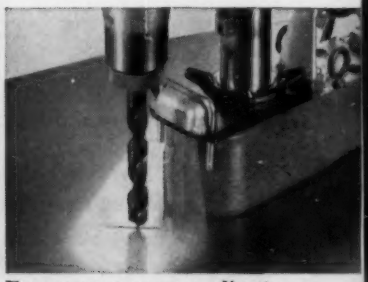


REVERSING SWITCH with time delay prevents motor being reversed too rapidly. Adds longer life—increases safety.



VERSATILE MAGNETIC UNIT can be used apart from drill press to hold pieces for butt welding and other jobs.

DRILL POINT LOCATOR provides accuracy never before possible. Gets close tolerances fast. Built into magnet.



EXCLUSIVE HEADLIGHT directs bright beam on work area. Special ruggedized bulb withstands hard usage.

EXCLUSIVE TWO-PIECE CONSTRUCTION (magnet separate from drill press) and tool caddy for easier, safer handling. Caddy keeps tool in one place—ready for the job. Unit placed in position with minimum exertion.

MAIL TODAY FOR FREE DEMONSTRATION

The BLACK & DECKER MFG. CO., Dept. 0809, Towson 4, Md.

☐ Please arrange a demonstration of the new B&D Magnetic Drill Press.

☐ Please send me additional information.

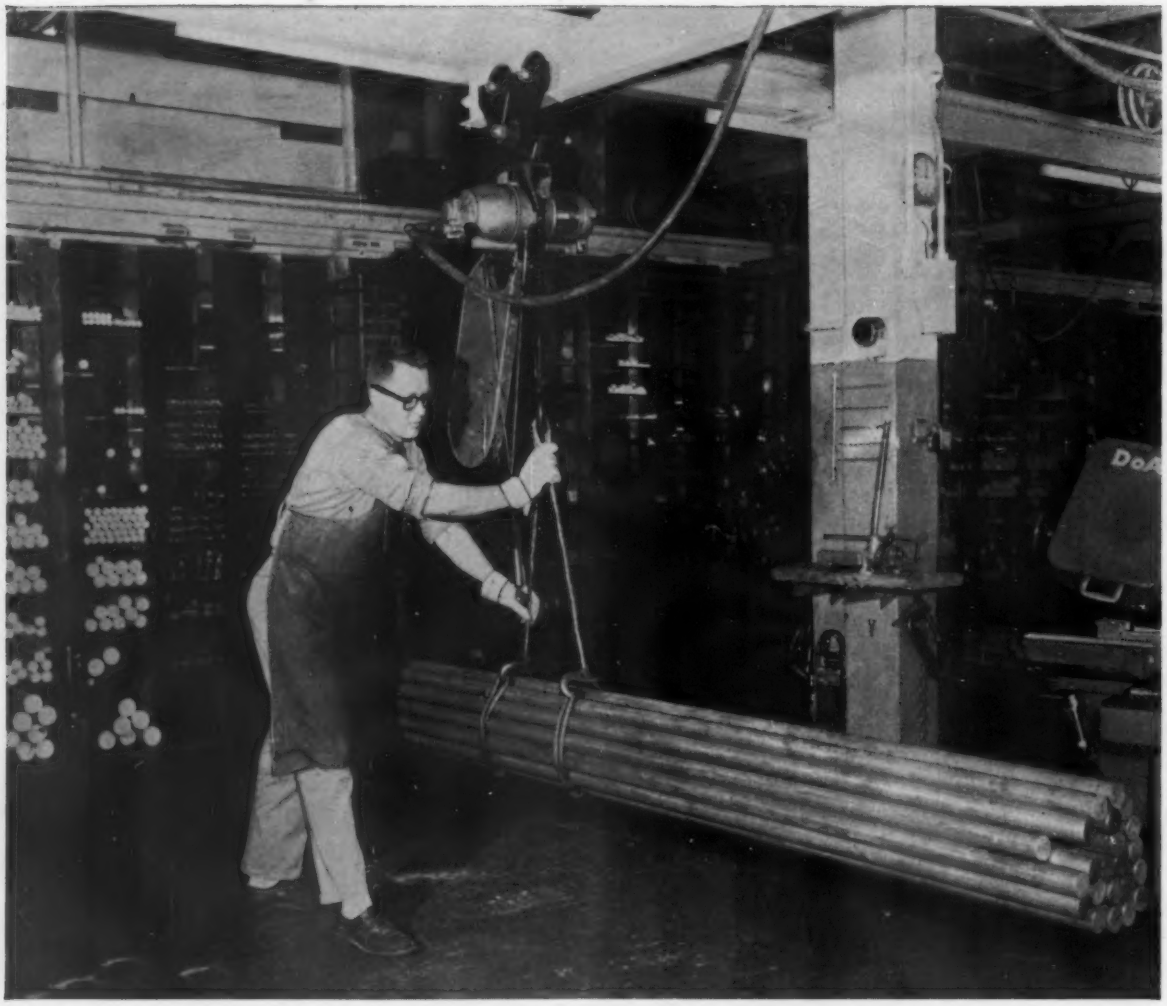
Name.....Title.....

Company.....

Address.....

City.....Zone....State.....

For more facts circle 545 on Reply Card



4000 POUNDS OF POWER

in a 100-pound package

Raise 4000-pound loads at 10 feet per minute with this rugged Keller Tool air hoist. It weighs only 100 pounds, yet handles 2-ton loads with safety. Top and bottom swivel arrangement enables hauling as well as lifting.

Motor can't burn out. This hoist is powered by a Keller Tool axial piston air motor that can't burn out. Eliminates lost production.

Lightweight, relative to lifting capacity, this handy air hoist is easy to move and hang.

Economical. Air consumption is low. Unit requires little servicing or maintenance.

Easy, safe operation. Operator controls machine with one hand, guides load with the other. Powerful brake holds load regardless of air supply. Exclusive safety cable hole further protects operator and load.

Keller Tool air hoists are available in lifting capacities of 150, 300, 500, 1000, 2000 and 4000 pounds. Request Bulletin 86.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

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Completely Oil-Sealed!

A-B QUALITY

802TC Side Push Rod Type

802TF Rod Type

802TA Roller Lever Type

802TB Top Push Rod Type with Plastic Window

802TAO Roller Lever Type for Cavity Mounting

802TG Adjustable Roller Lever Type

SEALED HEAD KEEPS OUT OIL, COOLANT, METAL CHIPS ...your guarantee of reliable limit switch operation!

With *completely sealed* operating heads, as well as sealed switch bodies, Allen-Bradley Bulletin 802T oiltight limit switches provide maximum reliability in limit switch operation for your modern, high speed production machines. The sealed head excludes oil, dirt, and metal chips from the operating mechanism ... the spring return, momentary contact operators cannot become sluggish and stick.

The maintenance free, double break, silver alloy contacts are sealed in the oiltight body. Interchangeable operating heads are available with various push rods and levers which can be mounted in any one of four positions. Oiltight transparent plastic covers, for inspecting contacts and wiring without removing the cover, are available for most units.

Here's a line of *quality* limit switches in which each type will provide millions of trouble free operations. Have your A-B control engineer acquaint you with this latest development—another advance in limit switch design.

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

9-57-MR

NOW... ALLEN-BRADLEY PRECISION-TYPE LIMIT SWITCHES ARE ALSO OILTIGHT!

OILTIGHT HEAD — Newly designed head on push type seals out oil. Roller lever types have sealed operating shafts.

OILTIGHT BODY — Synthetic rubber gasket between housing and plate excludes oil and coolant from operating mechanism.

Allen-Bradley precision-type limit switches combine very close operating tolerances with such a sturdy construction that they can be used for any industrial application. Now this line of limit switches has been further improved by making them completely oiltight.

Especially designed for use where the motion to operate the limit switch is measured in thousandths of an inch, these Allen-Bradley limit switches can henceforth be employed in applications where oils, coolants, and dust are present.

Allen-Bradley Bulletin 802 oiltight precision limit switches have a positive snap action mechanism which prevents any possibility of a "dead center" . . . no matter how slowly the actuating force is applied. They are available in both the spring return and maintained contact construction. And all have maintenance free, double break, silver alloy contacts.

Specify these Allen-Bradley oiltight limit switches where "precision" operation is required and where dirt and oil could cause trouble.

Push rod type. Plastic cover, for inspection without removing cover, made for most units.

Roller lever type limit switch with lever on right side. Also available with lever on left side.

Roller lever precision-type limit switch with roller lever in front of the switch body.

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.
In Canada—
Allen-Bradley Canada Ltd., Galt, Ont.

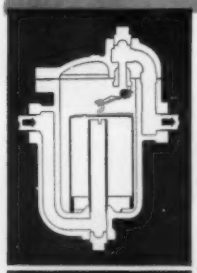
ALSO—GENERAL PURPOSE LIMIT SWITCHES

Bulletin 801 general purpose limit switches in standard or heavy duty ratings. Maintained or momentary contacts with slow or snap action. Silver alloy contacts used throughout this line.

A-B QUALITY

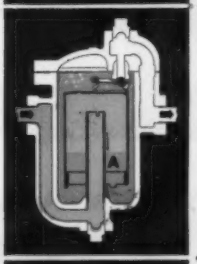
9-57-MR

How Armstrong Trap Design Improves Plant Efficiency . . .

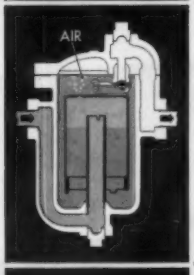


1 When trap is first installed, the inverted bucket is down and the valve is wide open. The large clearance between valve and seat minimizes restriction to condensate flow, contributing to large capacity.

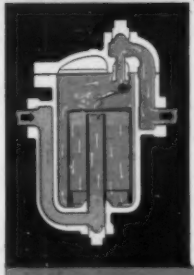
2 When steam is turned on, note how condensate (solid color) flows down between bucket and trap body, then up and out through orifice. Dirt is held in suspension and washed out when valve opens.



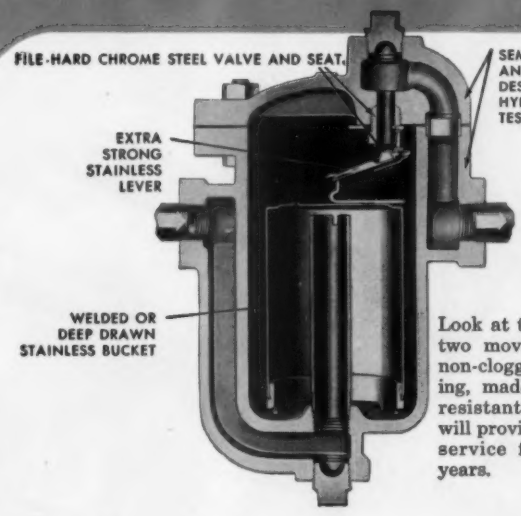
3 When steam reaching trap displaces less than ⅔ of the water in the bucket, it floats, closing the valve. Generous safety margin (dimension A) insures that steam will never reach trap orifice.



4 When more condensate enters trap, the bucket loses buoyancy and pulls on valve lever. (Note how incoming air passes through bucket vent and collects at top of trap, awaiting discharge.)



5 When weight of bucket times leverage overcomes pressure on valve, trap opens, creating momentary pressure drop that "pumps" condensate and non-condensibles from unit being drained.


FILE-HARD CHROME STEEL VALVE AND SEAT.
SEMI-STEEL BODY AND CAP. 250 LBS. DESIGN PRESSURE—HYDROSTATIC TESTED AT 500 LBS.
EXTRA STRONG STAINLESS LEVER
WELDED OR DEEP DRAWN STAINLESS BUCKET

Look at this trap. Only two moving parts. It's non-clogging, non-sticking, made of corrosion resistant materials. It will provide trouble-free service for years and years.

Time-Tested Inverted Bucket Principle Provides Five Cost-Reducing Benefits:

The modern Armstrong Trap is unsurpassed in these five major contributions to plant operating efficiency:

1. Fast heat-up—thanks to large condensate and air handling capacity. On batch or cycled production, you get maximum output per day.

2. High heat transfer rate—quick opening creates a sudden surge of condensate and air from the unit being drained. This pumping action prevents stratification of incondensibles and insures complete drainage. Laboratory and field tests prove it produces higher heat transfer than is otherwise possible.

3. Low Fuel Consumption—non-productive radiation losses are minimized because condensate is discharged at steam temperature as fast as it accumulates in the trap—you get more production per hour and per unit of fuel. And, there is no steam loss through the trap orifice.

4. Continuity of operation—the trap always opens for condensate; the simple, sturdy, self-cleaning mechanism insures continuous operation between inspections without interruption of processing.

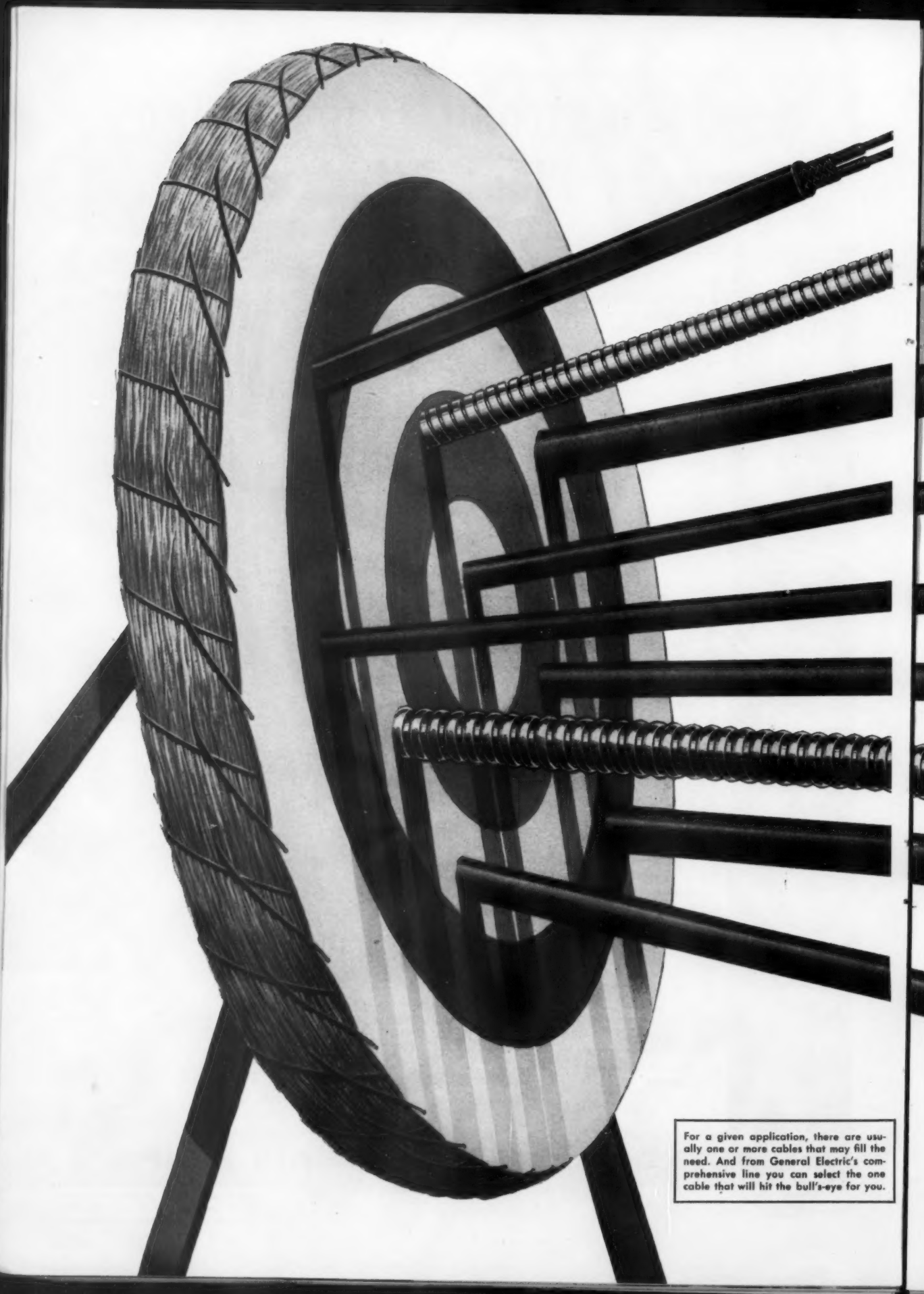
5. Low Maintenance—no trap has ever gained so enviable a record for trouble-free service—ask anyone who has kept records.

Free: Steam Trap Book—
44 helpful pages on trap selection, installation maintenance, physical data and prices. Call your local Armstrong Representative or Distributor, or write:

ARMSTRONG MACHINE WORKS
9129 Maple Street • Three Rivers, Michigan

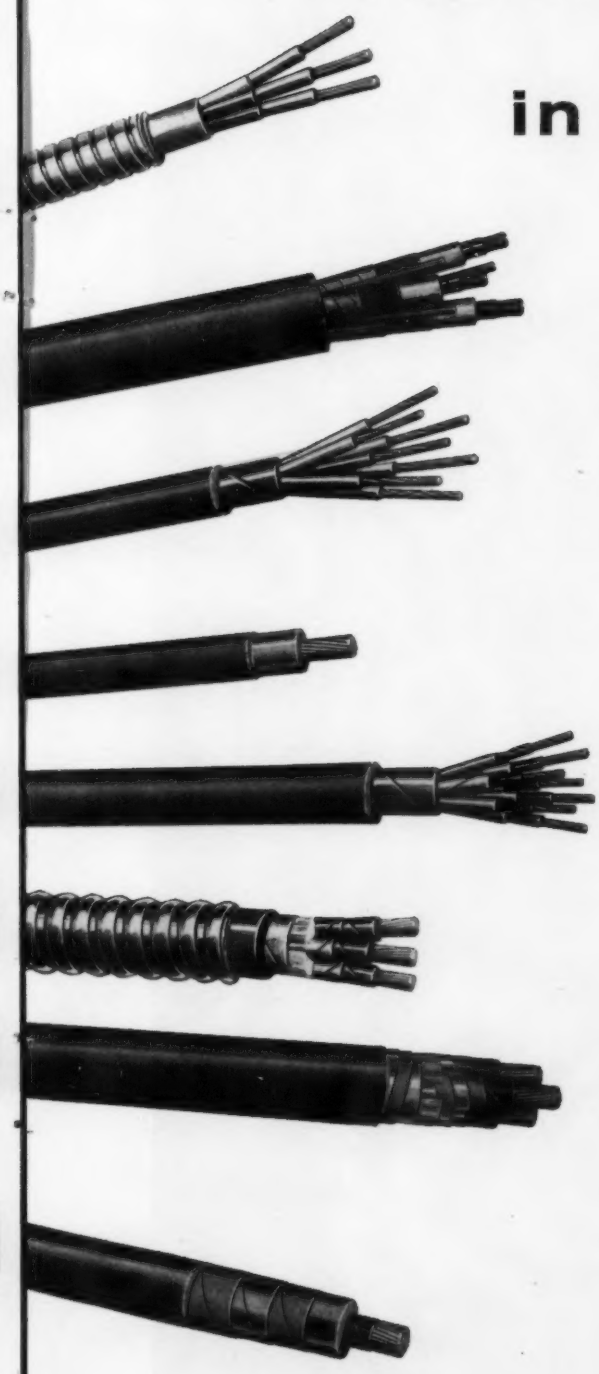
ARMSTRONG *Inverted Bucket* STEAM TRAPS

For more facts circle 548 on Reply Card



For a given application, there are usually one or more cables that may fill the need. And from General Electric's comprehensive line you can select the one cable that will hit the bull's-eye for you.

The importance of accuracy in cable selection



Today, selection of the best wires and cables for your particular needs demands that a wide variety of factors be considered, ranging from standard requirements such as flame-resistance, heat-, moisture-, and weather-resistance—to special constructions which withstand vibration, the electromagnetic effects of adjacent power cables—even the effects of atomic radiation.

General Electric has developed hundreds of cables for just about every possible application. Thus, General Electric engineers are never limited to one wire or cable for a given job but can suggest the most efficient and economical solution for the particular situation.

This is one of the important reasons why many electric utilities and industrial plants work with General Electric wire and cable engineers in planning their electrical expansion and modernization programs. Another reason is General Electric's knowledge of the requirements of other basic components of power distribution systems—transformers, load centers, switchgear, etc.—the knowledge that the right cable plays an important part in satisfactory system performance.

All this adds up to experience that can benefit you. Take advantage of it the next time you have a cable selection problem. For information on your specific wire and cable application or selection problem, see the G-E wire and cable specialist in your locality or write Section W197-964, Wire and Cable Department, General Electric Company, Bridgeport 2, Connecticut.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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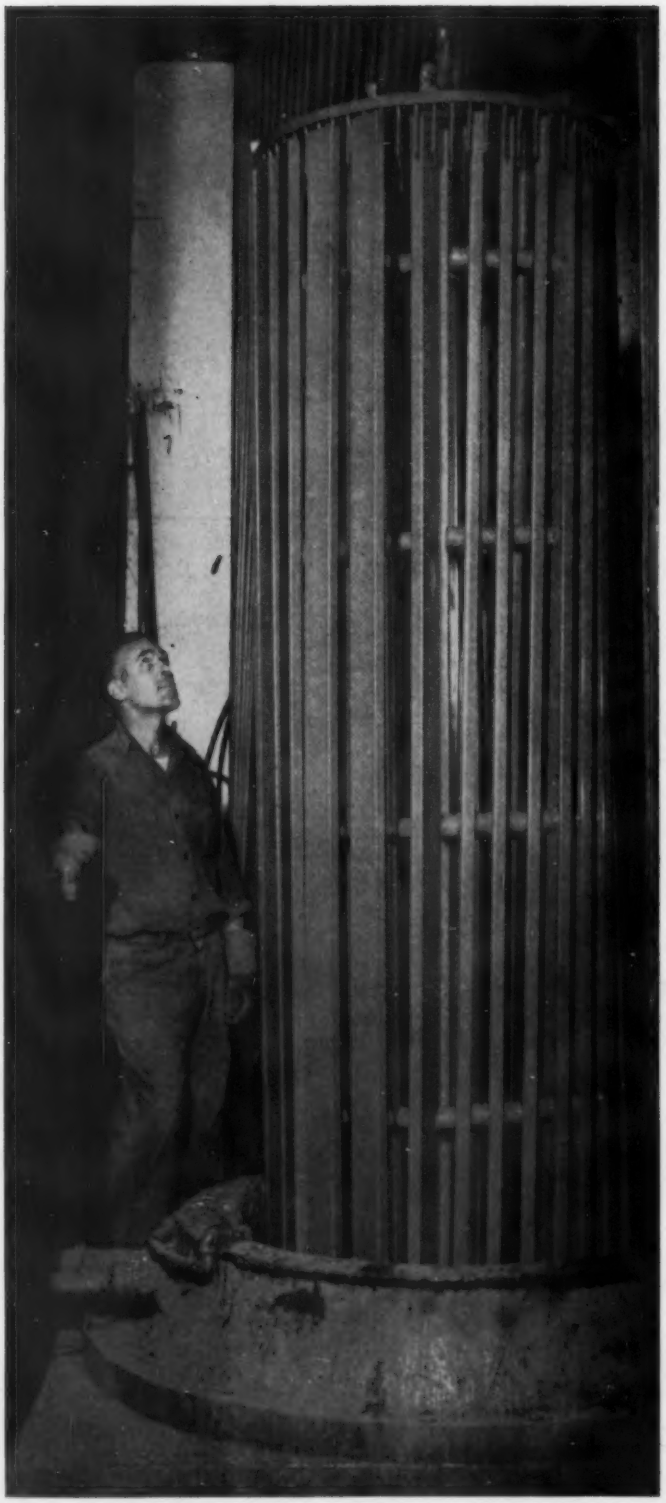
ONE DIP, AND ZIP...



This Walkerduct is double-armored . . . thanks to Parlon®-based Paint

Walker Brothers of Conshohocken, Pennsylvania, are justly proud of the Dualcote finish on their electrical raceways and conduit because of the severity of service which it will withstand. On top of a special "fused" coat of zinc a special Parlon-based protective coating is applied.

The result is a product that is thoroughly protected inside and out. The zinc protects the steel; the Parlon chlorinated rubber coating in turn protects the zinc. This double-armored finish will thus withstand attack by acids, alkalies, condensation, even salt water immersion — as has been proved by many tests.

Here, in these products, is a two-pronged weapon in the never-ending battle against corrosion. The Dualcote finish itself insures minimum maintenance for your electrical system. And a properly formulated Parlon-fortified system can almost singlehandedly solve your equipment and structural maintenance worries.

More than 400 paint companies know and use Parlon in many of their extra service maintenance paints—for metal, concrete, masonry, and wood. Therefore, ask your regular source what the right Parlon-based paints can do for you.

Cellulose Products Department

HERCULES POWDER COMPANY

INCORPORATED

900 Market Street, Wilmington 99, Delaware

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WITH THIS RESIN... Firestone EXON 480 RESINS YOU MAKE A BETTER BATCH OF "BISCUITS" EVERY TIME!

EXON 480... specifically for (tone perfect) phonograph records

typical of the Pin-Pointed Qualities in Exon Vinyl resins

These "biscuits" are compounded of Exon 480, the vinyl resin created specifically for phonograph records. With each, you get a finished recording of high tonal quality and breakage resistance.

Exon 480 combines many production advantages in the blending, fusing, preforming and molding processes. For instance, here's one production economy: Exon 480's higher bulking density speeds banbury output as much as 25%.

You also get high thermoplasticity, good heat and light stability, plus compatibility with the vinyl plasticizers, stabilizers and pigments most often used. No wonder so many record makers specify Exon 480 for better "biscuits" every time. Another example of how Exon's Pin-Pointed Properties match your particular needs.

Exon 480 is just one of the many fine resins in industry's most complete line of versatile vinyls. It is another reason why industry looks to Firestone Exon for engineered answers to its needs.

Consider your own production or product problem. Then, for resin properties pin-pointed to the best answer for you, check with Firestone.

Firestone EXON RESINS

For complete information and technical service, call or write:

CHEMICAL SALES DIVISION: FIRESTONE PLASTICS COMPANY

DEPT. POTTSTOWN, PA. • A DIVISION OF THE FIRESTONE TIRE & RUBBER CO.

IN CANADA, CONTACT CHEMICAL SALES DIVISION, FIRESTONE TIRE AND RUBBER COMPANY OF CANADA LTD., HAMILTON, ONT.

INDUSTRY'S MOST COMPLETE LINE OF VINYLS ENGINEERED TO YOUR SPECIFIC NEEDS

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"We avoided costly service calls and saved our customers irritating shutdowns ..*by equipping welders we sold with Fusetron Fuses*"....

Frank Korinek, OWNER
SUN RAY ELECTRIC COMPANY
CHICAGO, ILL.

Mr. Korinek continues . . .

"About a year ago my motor rewind shop bought 62 welders for resale from a surplus dealer.

"They were 300 ampere arc welders, with the A.C. motor directly connected to a 300 ampere D.C. generator. The motor has a speed of 3500 R.P.M. and a nameplate rating of 56 amperes at 220 volts.

"The welders were equipped with 60 amp., 250 volt fuse clips. However, when we ran the welders in the shop, we found that ordinary 60 amp. fuses would blow on the starting current of the motor.

"We then tried 60 ampere Fusetron dual-element fuses. They proved to hold the starting current and to give the needed protection to the motor and generator.

"We are glad we had this experience in our own shop and installed Fusetron fuses before selling the welders. Otherwise, we would have had a flock of costly unnecessary service calls and run the risk of losing customers.

"As it happens, our customers are satisfied with the performance of the welders and we haven't had a service call or complaint about needless fuse blows."

FUSETRON dual-element FUSES do more than eliminate needless blows. They give 10 point protection not available with any other type of protective device.

AND FUSETRON FUSES REMAIN SAFE THRU THE YEARS . . .

. . . without maintenance and recalibration costs.

Once properly installed, Fusetron fuses require no costly inspection time or maintenance necessary on mechanically operated devices.

Dust, fumes, corrosion or age cannot prevent a Fusetron fuse from opening safely. There are no hinges, pivots or contacts to stick or slow down the operation of the fuse on short-circuits.

When a Fusetron fuse does open to protect, and after the fault has been corrected—the new Fusetron fuse you install has been calibrated at the factory by engineers—it is a fuse as safe and dependable as the one that blew.

DON'T RISK LOSSES! *One needless shutdown . . . one lost motor . . . one destroyed switch or panel . . . one burned out solenoid . . . may cost you far more than replacing every ordinary fuse with Fusetron dual-element fuses. Write for bulletin FIS.*

For loads above 600 amps.—Use BUSS Hi-Cap Fuses to coordinate your electrical circuits.

On 600 volts or less, BUSS Hi-Cap fuses have an interrupting capacity sufficient to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuits of origin. Write for bulletin HCS.

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

Bussmann Mfg. Division
McGraw-Edison Co.
University at Jefferson, St. Louis 7, Mo.

Play Safe! Install Fusetron dual-element fuses and BUSS Hi-Cap Fuses throughout entire Electrical System!

957

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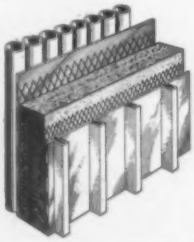
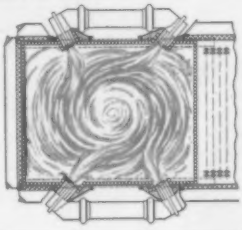


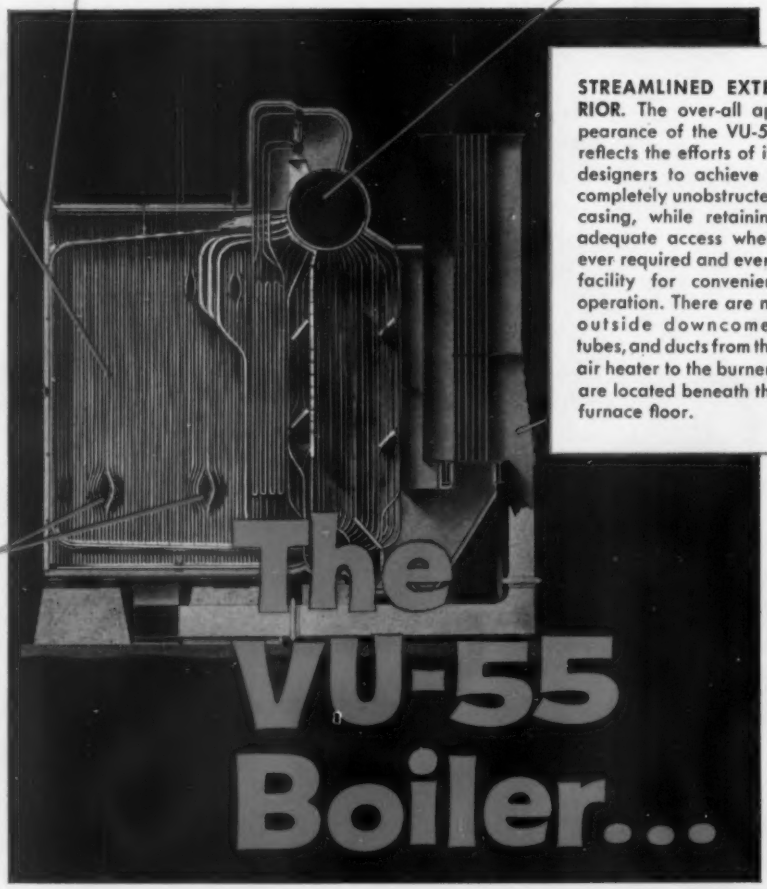
DOUBLE WALL, PRESSURE-TIGHT CASING. The latest development in casing construction for pressure firing of boilers in the size class of the VU-55, this casing is designed to assure life-time tightness with minimum heat loss. Pressure firing permits the elimination of an induced draft fan with its attendant operating and maintenance costs. Construction consists of tangent tubes backed up successively by welded steel panels, 4 inches of high quality insulating material and an outer steel casing formed as shown to provide adequately for expansion and assure ample strength. Low heat loss and the tightness required for pressure firing are assured by this double-wall construction.

HIGH STEAM QUALITY. Equipped with a large (60-in.) steam drum, the VU-55 has generous water capacity and steam reservoir space. C-E drum internals assure high quality steam at all ratings.

TANGENT FURNACE TUBES. The VU-55's furnace tube arrangement provides complete heat-absorbing, water-cooled protection on all furnace walls. Furnace maintenance is minimized, refractory expense is eliminated, heat absorption rates per sq. ft. are higher.

TANGENTIAL FIRING. More than 20 years of application experience have established the exceptional advantages of tangential firing. About 90 per cent of Combustion's large utility installations use this advanced method of firing. Flame streams from the four burners impinge upon one another at high velocity, as shown, creating a turbulence unattainable by any other method of firing. The result is rapid and complete combustion. As the gases spiral upward, they sweep all furnace heating surfaces, assuring a high rate of heat absorption.





STREAMLINED EXTERIOR. The over-all appearance of the VU-55 reflects the efforts of its designers to achieve a completely unobstructed casing, while retaining adequate access wherever required and every facility for convenient operation. There are no outside downcomer tubes, and ducts from the air heater to the burners are located beneath the furnace floor.

Custom Features, Standard Sizes, Advanced Design

The VU-55, newest of the C-E line of Vertical Unit Boilers, represents the closest approach to central station performance yet achieved in standardized boilers in its capacity range.

Its design combines a number of time-tested and service-proved features, such as Tangential Burners, double wall, pressure-tight casing, and tangent furnace tubes. In addition, this bottom-supported unit requires no outside supporting steel, is economical of space and streamlined in appearance.

It is available in 5 sizes for capacities from 50,000 to 120,000 lb per hour. It is designed for 3 pressure ranges (250, 500 and 750 psi) and can be equipped with a superheater to provide temperatures up to 750 F. Either a tubular or a regenerative air heater is available.

The VU-55 Boiler is symmetrical in design, performs efficiently over a wide range of output, and is easy to operate and maintain.

It is, in fact, the boiler with the custom features and the advanced design.

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B-978A

all types of steam generating, fuel burning and related equipment; nuclear reactors; paper mill equipment; pulverizers; flash drying systems; pressure vessels; soil pipe.

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COURT DECISIONS — a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Employee Information

APPLICATION WAS recently made by a dealer in alloy and tool steel for an injunction against a former employee who was soliciting the trade of customers of this dealer. During his employment by this dealer the employee had become familiar with the names and addresses of the customers and that information, the dealer contended, was confidential and secret.

There was no directory, the dealer asserted, nor any other list of buyers using alloy or tool steel by which the employee could secure such information. Accumulation of this list of customers, it was contended, had been compiled by personal contact, letters and advertisements to screen these buyers and to segregate those requiring this product.

This injunction the court refused to grant.

"Some knowledge gained by an employee," said the court, "is of such a general character that the courts will not restrict its later use. An employee has a right after the association of employment, to use anything that is not the property of his employer. Trade and business secrets and confidential information are the property of the employer and cannot be used by the employee for his own benefit." American Alloy Steel Corp. v. Ross, 308 Pac. 2d 494, California, March 18, 1957.

Liability for Injury

POWER LINES charged with 35,000 volts were strung across and over a railroad siding of a Pennsylvania plant. Carloads of tubing had been spotted immediately underneath these power lines and were being unloaded by a crane operator and helper with a long boom crane. The boom of the crane swung close to the power lines. Current arced to the boom and into the body of the helper who was putting a sledge into the tool box of the crane.

On an appeal from a judgment for $111,103.42 awarded the laborer against the plant, it was contended that there had been no latent or hidden defect or dangerous condition but rather an obvious condition which was apparent to anyone coming upon the premises. Further, that the employer had no more knowledge of arcing or electrical discharge than this employee.

Of this argument, the Pennsylvania court said that the presence of these power lines in and of itself did not indicate obvious danger. This employee was not bound to know the degree of danger involved.

The plant owner, on the other hand, was bound to know the degree of danger involved. "Those handling electricity," continued the court, "are not only bound to know the extent of the danger but are bound to use the very highest degree of care practicable to avoid injury to everyone who may be lawfully in proximity to such wires and liable to come accidentally or otherwise in contact with them. This employee had the right to assume that one in authority would not lead him into danger without warning." Stark v. Lehigh Foundries, 130 Atl. 2d 123, March 18, 1957.

Chlorine Damages

IN CORPUS CHRISTI, TEXAS, suits were brought by eight automobile owners against a chemical plant for damages to the glass and chrome trimmings of their cars from chlorine fumes.

On appeal from a judgment against the plant owner, it was argued that the damages had been assessed by the court without evidence that the gas and fumes were under the control of the plant.

Witnesses had seen smoke and steam drifting over the cars from the chlorine burner of the plant. Further, the plant was dispensing approximately 180 tons of chlorine a day. Operated properly this burner would discharge harmless quantities of hydrochloride and chlorine into the air, but at the time of this incident it was being operated by two employees with one to two weeks' experience.

In sustaining this judgment, the appellate court held that these facts proved that the burner could have been controlled sufficiently to raise the presumption of negligence which the plant owners had failed to excuse. Columbia Southern Chemical Corp. v. Johnson, 297 S.W.2d 373, October 31, 1956.

Patent License Royalties

UNDER A LICENSE for the manufacture and sale of patented ventilated awnings for a 38-month period, the licensee agreed to pay $2000 in addition to a royalty of 5 per cent of the gross sales price of any awnings manufactured or sold in the agreed territory, with a $100,000 minimum annual sales guarantee.

In a suit to recover these royalties which remained unpaid under this contract, the licensee set up in its defense that the patents that had been licensed, were invalid and infringed by prior patents, thus preventing the manufacture and sale of the awnings by this licensee. The licensee further demanded the refund of the payments it had already made.

In its reversal of a judgment in favor of the licensee for the money it had paid, the appellate court said of the term "royalty" when used in connection with the word patent, that it means the compensation or rent paid for the use of the invention.

The relationship between a licensor and a licensee of a patent, the court compared to the relationship between a landlord and a tenant. "There is, however," said the court, "no implied warranty or covenant of quiet enjoyment in the sale or lease of a patent. Hence, covenants are frequently inserted in licensing agreements to protect the licensee against claims which may arise because of asserted infringements by licensee's use of the patent or against infringement on his right to use.

"In this respect the law is different," said the court, "from leases of realty. The tenant is protected by an implied covenant. Since royalties are rents payable for the use or right to use the invention, there is no obligation to make payments of rents

COURT DECISIONS

accruing after the right to use has terminated. Hence, an eviction which deprives the lessee of the right to enjoy the license relieves him of the duty to continue making payments under the license.

"But if what remains is of value to and is used by the licensee, there has been no such eviction as to completely discharge him from liability to his licensor. So long as one recognizes the right to use a patent and acts thereunder he is liable for royalties. If he would escape liability for royalties he must disavow the contract and cease to use the right granted." Wynne v. Allen, 96 S.E. 2d 422, February 1, 1957.

Arbitrary Price Increases

UNDER A PURCHASE contract made by a casting company with a Missouri manufacturer, 100,000 cast aluminum parts were to be supplied this manufacturer at a unit price of 52 cents each. Also the company was to supply permanent molds for the castings with that charge amortized over these parts at a sum not to exceed 3.6 cents each.

When approximately 20,000 castings had been delivered, the casting company complained that because of increased metal costs it was forced to increase the unit price from the original agreement of 52 cents to 78-¾ cents.

To fill orders it already had on hand, the purchaser had no time within which to secure these castings elsewhere. Under the circumstances it adopted the only course available, continued purchasing the castings until it could contract for their manufacture elsewhere and then refused further deliveries from this casting manufacturer.

In denying the casting company a recovery in its suit for this increased price, the Missouri court said, "That while an agreement made in substitution of a prior executory contract annulled a former contract and was in itself a sufficient consideration for a release from its obligations, the substituted agreement must contain a change of the obligation of each party in order to constitute a consideration.

"When a party merely does what he is obligated to do," said the court, "he cannot demand an additional compensation. Although by taking advantage of the necessities of his adversary he obtains a promise for more, the law will not lend its process to aid in a wrong." Rexite Casting Co. v. Midwest Mower Corp., 267 S.W.2d 327, April 20, 1954.

Warranty of Fitness

IN EQUIPPING a plant for the production of a composition feed of corn-oil-meal and black strap molasses, the owners interviewed an engineer of a fan manufacturer. In the course of that interview the engineer said he knew nothing of the process of drying molasses. "That's nothing to be alarmed about," replied one of the owners. "Neither do we."

Later a dryer was purchased from the engineer's firm which the purchasers themselves selected. When the dryer failed to produce the expected results, the purchaser sued the fan manufacturer for damages for breach of warranty.

In its decision denying this purchaser a recovery, the court quoted the statement of the law governing situations of this character that was made long ago by an English court. "If a man says to another, 'Sell me a horse fit to carry me,' and the other sells a horse which he knows to be unfit to ride, he may be liable for the consequences. But if he says, 'Sell me that grey horse to ride,' and the other sells it, knowing that the former will not be able to ride it, that would not make him liable."

To this the court added a statement of the law made by the Supreme Court of the United States. "Where a known, described and definite article is ordered of a manufacturer, although it is stated by the purchaser to be required for a particular purpose, still, if the known, described and definite thing be actually supplied, there is no warranty that it shall answer the particular purpose intended by the buyer." Stiefel Feed Co. v. Aerovent Fan Co., 148 F.S. 894, March 30, 1956.

Joint Patent Owners

IN A PATENT suit recently before the United States court in Delaware, the patent application had been signed jointly by two inventors. Subsequently, in interference proceedings one of these copatentees refused to be a part, to the proceedings.

"Assuming a patent is granted to the two inventors," said the court, "then the relationship created is a cotenancy. It is true that the cotenancy under the principles of the patent law differs somewhat from usual common law cotenancies and presents such anomalies that the Circuit Court of Appeals has said, 'Joint owners of a patent are at the mercy of each other.' One may use the patent or license others to so use without liability to other owners but a suit for infringement must be brought by all co-owners.

"The conclusion that a cotenant of a patent application may perfect the rights to such patent as against a recalcitrant cotenant who wrongfully maintains an adverse position," said the court in conclusion, "is in harmony with the general rules which have always prevailed in cotenancy." Turchan v. Bailey Meter Co., 19 F.R.D. 201, May 14, 1956.

"Fishing Tools"

SUIT IN A Federal court in Texas was brought for the infringement of a patent on equipment used for removing objects lodged in oil wells. Of the patent, claimed here to be infringed, the Federal District Court had held it was unimportant and lacking in utility, hence that there was no infringement.

"The basic approach of all the devices here involved, "said the court," is to anchor one part of the fishing tool to the well casing reasonably close to the stuck object and to attach the other part of the tool to the object itself, then exert a force between the two parts of the tool that will cause the object to be moved upwards. Of this decision of the District Court, the Court of Appeals in reversing that judgement, said,

"The District Court's conclusion that the entire structure disclosed in that patent is useless, appears to be based on the one inconclusive experiment in which the tool was used but upon being pulled back to the surface, it was found that the 'fish' had escaped from the grapple. Since its entire conclusion of general inutility is based on one unsuccessful experiment, we hold that the District Court went too far in invalidating the patent." Hunt Tool Co. v. Lawrence, 242 Fed. 2d 347, March 15, 1957.

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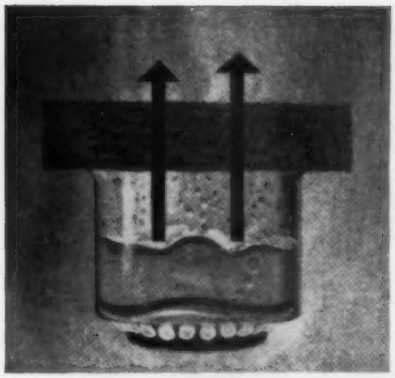

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is vapor-proof . . .

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can't carry a load...

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INSULATION
is strongest!

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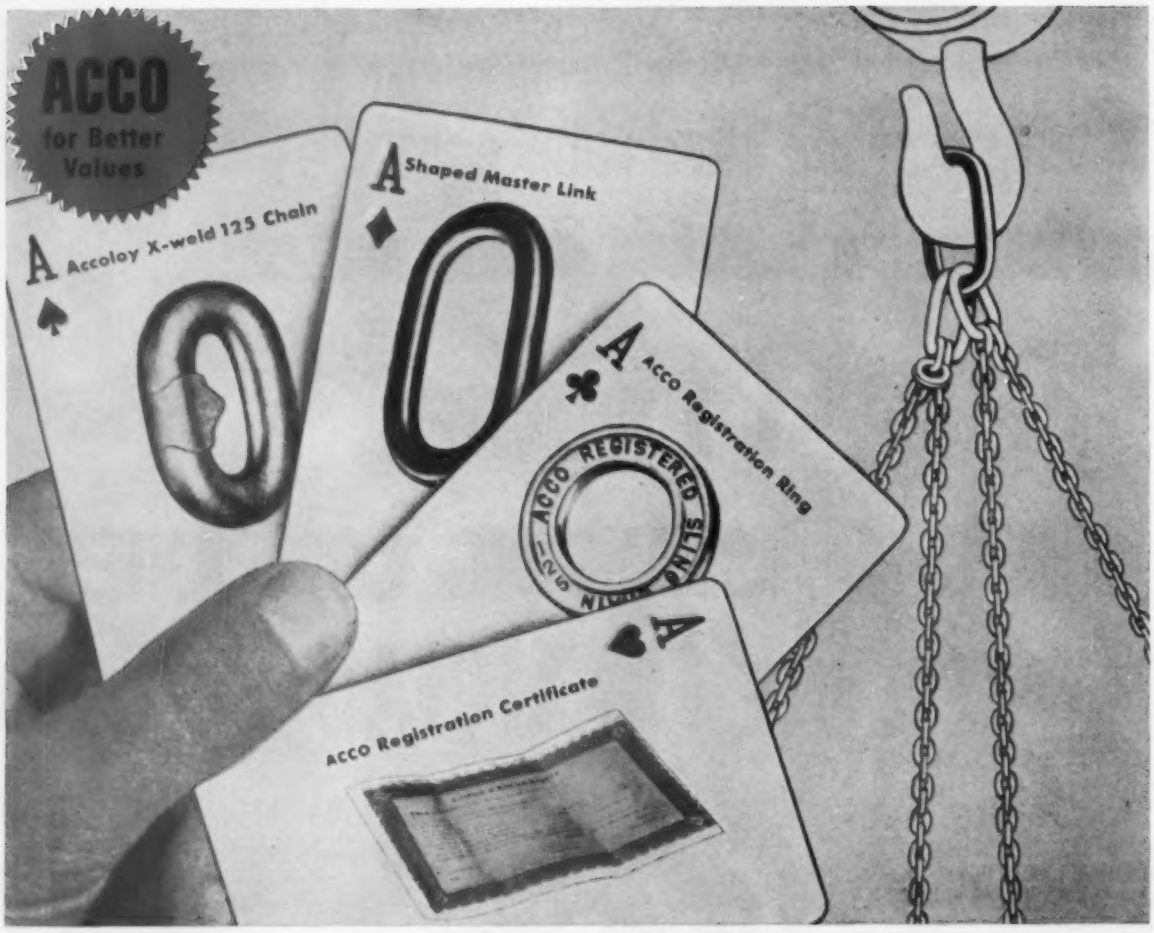

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• You get more than chain when you buy ACCO *Registered* Sling Chains. For you get "4 aces of extra value" which help make ACCO *Registered* Sling Chains the standard by which all other slings are judged. Here are the aces that make the winning hand:

First Ace: **Accoloy X-weld 125 Chain,** used where extra strength is desired. This patented chain (Pat. No. 2763768) has a king-sized welded area for exceptional strength—and it does not kink, but hangs straight as a die.

Second Ace: **ACCO's new Shaped Master Link,** which, thanks to its unique shape, withstands deformation under loads up to 18% greater than a conventional round-section link can.

Third Ace: **The ACCO Registration Ring,** bearing its own serial number as evidence that every component has been tested before assembly, and the assembled sling proof-tested to twice its working load limit before shipment. The ACCO Registration Ring is the symbol of ACCO quality—the finest.

Fourth Ace: **The ACCO Registration Certificate,** attesting to the field-tested design and proof test of complete sling to twice the working load limit. It is signed by American Chain & Cable Company, Inc., and is furnished with each ACCO *Registered* Sling Chain.

Only in ACCO *Registered* Sling Chains do you receive these "4 aces of extra value." Still another bonus: all hooks are Magnaflux-tested. Remember, these features are over and above the characteristics of strength, safety, long service life and long-pull economy that have made ACCO *Registered* Chain Slings industry's choice for an endless variety of lifting jobs.

See your ACCO *Registered* Chain Sling Distributor about your sling chain requirements. His seasoned counsel is available without cost or obligation. If you don't know his name, write us at York, Pa.

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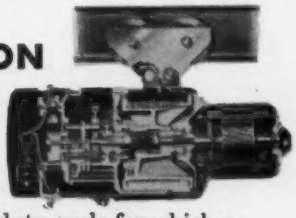
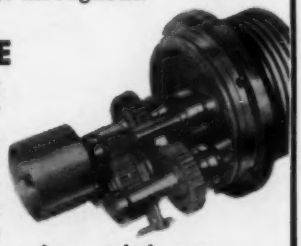


Fine balance and heavy duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30-minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core supplies shock resistance to most severe service stresses. Anti-friction bearings throughout.

LONGER LIFE



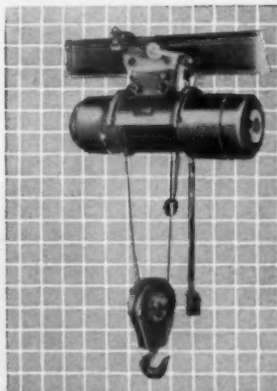
Strength of gear teeth of WRIGHT Frame 2 and 3 Speedway hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flanged cross section is bolted to drum at six points and provides extreme resistance to distortion.

EASIER MAINTENANCE

There is nothing to adjust but the cam to keep brake in perfect adjustment. When excessive load drift occurs... remove the screw shown at Position 1, swing the cam until Position 2 is in line. Replace the screw. Position 3 is provided for the final third of brake lining wear. Brake springs and solenoid never need adjustment.

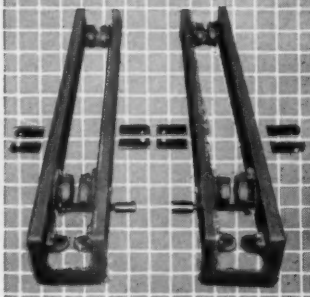
Better performance at lower cost by using WRIGHT units for local-built cranes

SPEEDWAY ELECTRIC HOIST



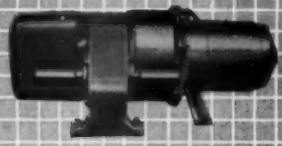
Available in Frame 1, 1½, 2 and 3 sizes with capacities from ¼ ton to 10 tons.

END TRUCKS



For motor-driven cranes and hand traveling cranes—both top running and under-hung types. Timken bearings throughout. Wide range of capacities.

CRANE DRIVE UNIT



For crane and double-beam trolley propulsion. Electric motor transmits power through fluid drive to well proportioned gear reduction. Units are equipped with WRIGHT designed solenoid "drag" brake. Size 1—with motors to 2 HP. Size 2—with 3 to 7½ HP motors.

for complete information on WRIGHT Hoists and Crane components ask for: ***Speedway Hoists:*** *(Frame 1) Booklet DH133B, (Frame 2 & 3) Catalog E55A.* ***Motor Driven Cranes:*** *Underhung, Single Bridge, Bulletin #227; Top Running, Bulletins #DH448 or DH449 •* ***Crane Drive Units:*** *Booklet DH-431A •* ***Hand Traveling Cranes:*** *Bulletins #DH-468 and #DH-348B*

Wright Hoist Division
AMERICAN CHAIN & CABLE

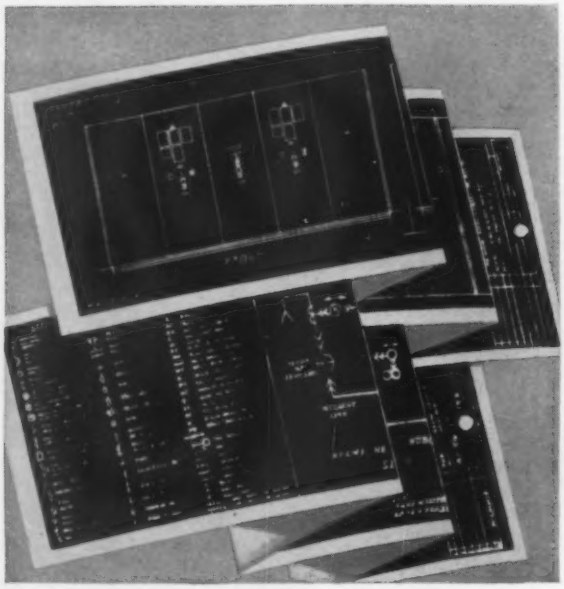
ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

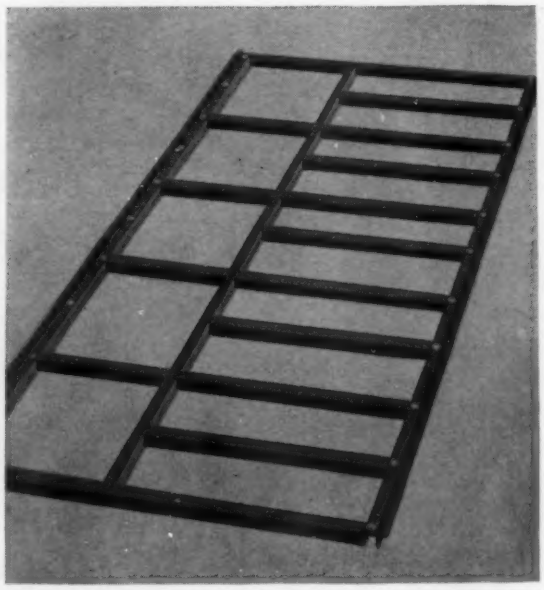
METAL-CLAD SWITCHGEAR

EASY INSTALLATION SAVES YOU TIME AND TROUBLE

I-T-E pre-engineers your installation before shipment...eliminates last-minute on-the-job fitting of switchgear to channel base



1. Complete drawings in advance. Shortly after placing your order, you will receive complete drawings showing the floor plan layout, outline dimensions, and single line diagram of the entire installation.



2. Prefabricated, painted channel base delivered first. Shipped upon request, well ahead of other equipment. Foundation bolt holes are pre-drilled to align with holes in switchgear housing.

Long before delivery of your I-T-E Metal-Clad Switchgear, you begin benefiting from the preliminary engineering and construction work which is a part of I-T-E's service to customers. It's another extra assurance of dependable performance you can expect from I-T-E equipment.

Floor plan, outline and single line drawings are supplied well in advance. Hence conduit can be run, floors poured, channel base set in place, and cables pulled. The switchgear, when it arrives, can be moved into position and connected according to plan quickly—saving you many installation hours on your premises.

I-T-E's advance planning for you helps insure that your switchgear installation can be completed well within the time allowed by your construction schedule.

In addition, of course, you benefit from the superior engineering, design and construction of the various components making up an I-T-E switchboard—all of which contribute to its faithful trouble-free performance for years after the installation.

If you are planning new construction, get full details on I-T-E Metal-Clad Switchgear, rated through 13.8 kv, 3000 amperes continuous and 750 mva interrupting. Contact the I-T-E sales office near you. Or write for Bulletins 7004B and C. I-T-E Circuit Breaker Company, Switchgear Division, 19th & Hamilton Sts., Phila. 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY—Switchgear Division

IN CANADA: EASTERN POWER DEVICES, LTD.

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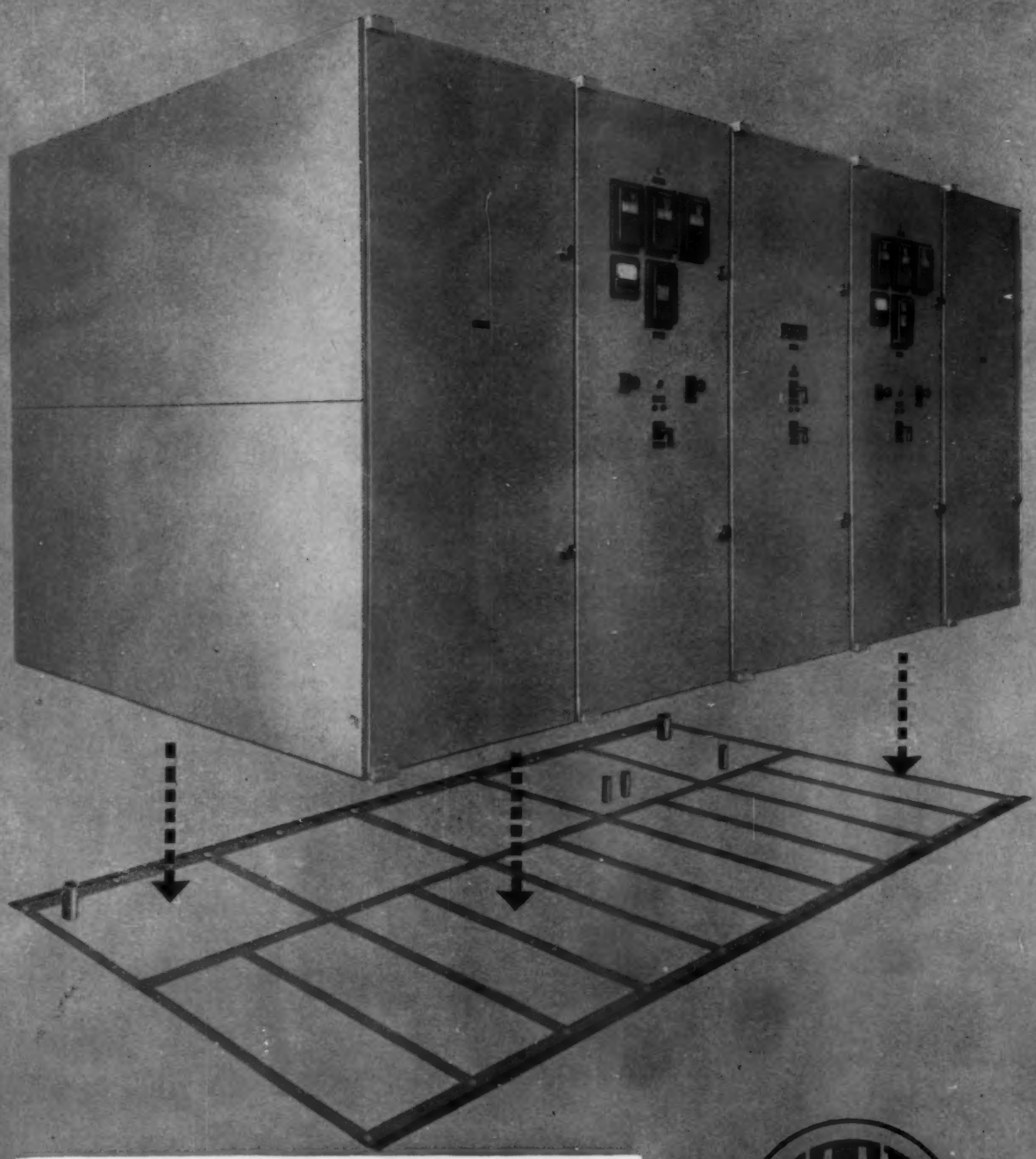
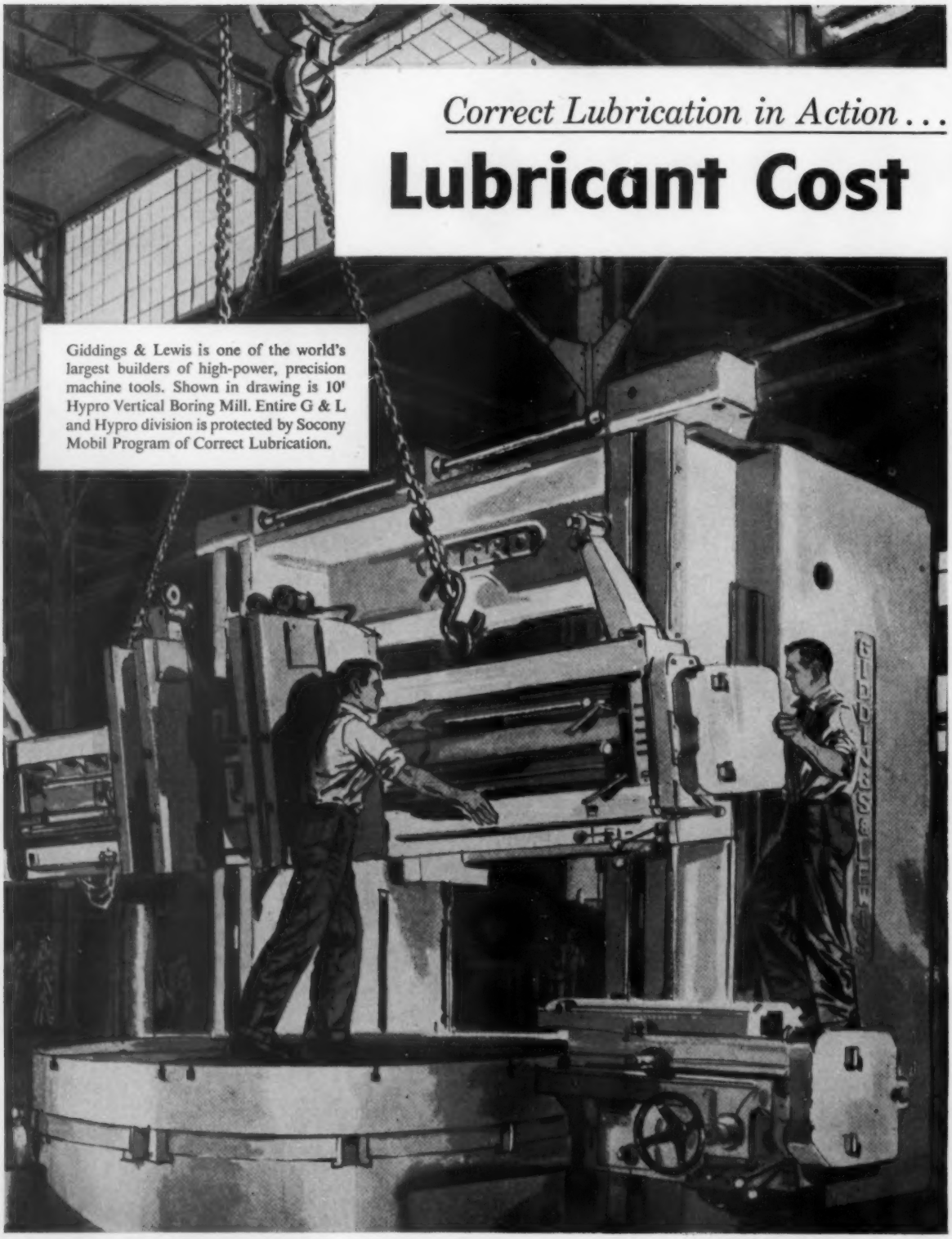


3. Sure fit—no delay. Channel base is embedded into the floor first. Then when switchgear is delivered it can be installed immediately. Sturdy I-T-E housings can be lifted in one piece by toe jack or chain hoist without distortion.

I-T-E

Correct Lubrication in Action . . .

Lubricant Cost



Giddings & Lewis is one of the world's largest builders of high-power, precision machine tools. Shown in drawing is 10' Hypro Vertical Boring Mill. Entire G & L and Hypro division is protected by Socony Mobil Program of Correct Lubrication.

Mobil **SOCONY MOBIL**

Leader in Lubrication for over 91 years

in the **Machine Tool Industry**

Per Machine Cut 18%

One of many ways Giddings & Lewis Machine Tool Company has increased profits with the help of Socony Mobil

To Giddings & Lewis, one of the most direct ways to increase net profits is to reduce maintenance costs. That's why this company, a leading builder of quality, high-precision machine tools, relies on a Mobil Program of Correct Lubrication.

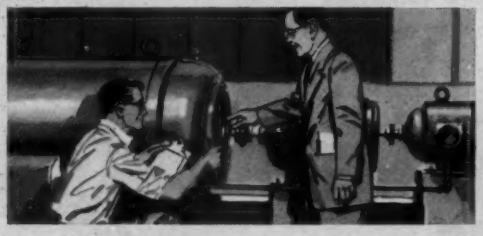
In just three years a Mobil "team" of lubrication specialists, working closely with plant personnel, cut lubricant costs per machine 17.9% . . . reduced lubricant application cost 7.6%.

These savings were but a few of the many and varied cost-cuts achieved through Mobil products and Mobil service. They reflect the many hours spent by Socony Mobil field and laboratory personnel in studying machine operations, preparing technical reports, making analyses of products in use.

Why not rely on a Mobil *Program of Correct Lubrication* to help *you* improve production and reduce maintenance costs?

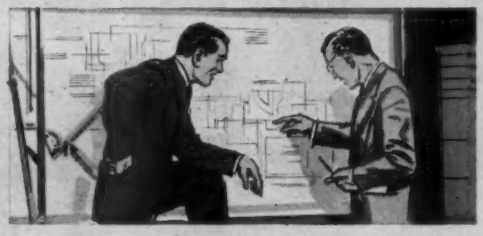
Can you afford to accept less than a cost-cutting service like this?

After a Mobil representative makes a lubrication analysis of your plant, a program of Correct Lubrication is put into action. Described below are some of the features of this program and how they benefited Giddings & Lewis.



Lubrication specialists, the most experienced in the petroleum industry, are ready to help you solve the knottiest lubrication problem. **For example, a Mobil engineer helped G & L solve a problem of repeated bearing failures on shop planers. His lubricant recommendation eliminated the trouble . . . saved $244 a year on each planer.**

Constant Quality Checks are kept on Mobil lubricants in use. Socony Mobil offers more analytical service than any other oil company. As a result, you can *safely* get maximum life from every Mobil product. **At the G & L and Hypro division Mobil quality oils are repeatedly filtered and put back to work. Periodic checks by Mobil laboratory analyses show oils to be in "like new" condition even after years of service.**



Thorough knowledge of machine design—Mobil engineers work closely with designers and builders . . . advise on hydraulic and lubrication system design . . . suggest the correct products for each machine. **G & L affixes a lubrication plate to every machine they produce. It specifies the use of the right Mobil product (or equivalent quality) to assure satisfactory operation wherever these machines are used.**

In-plant training clinics are conducted by Mobil engineers. Maintenance personnel are instructed in proper application procedures . . . taught to recognize trouble before it occurs. **At G & L, frequent electric motor failures were found to be caused by over-application of grease. Instruction corrected this trouble . . . reduced application time by 66% . . . cut grease consumption, too.**

Correct Lubrication

A proved program to reduce maintenance costs

SOCONY MOBIL OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP., MOBIL OVERSEAS OIL CO., INC.

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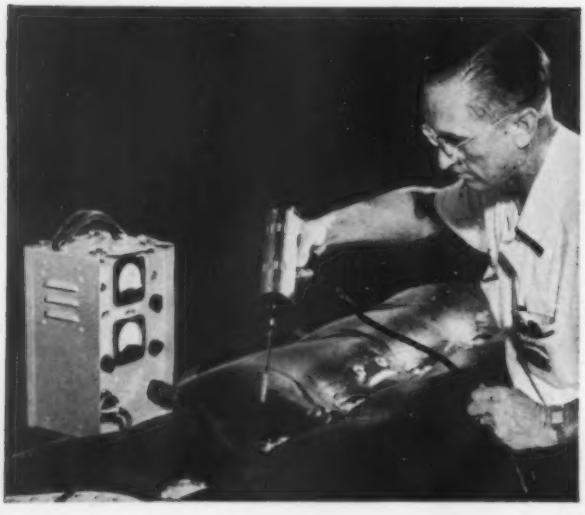
SAVINGS | LEAK DETECTION

Detection Cuts Costs 85%

Whenever leaks can be expensive in terms of money, safety, efficiency or reputation, there is a General Electric Leak Detector designed with your applications in mind. Three General Electric detectors, the Type H-1, the Fixed-head Detector, and the Type M-2 Mass Spectrometer Detector, are available. All are currently in use throughout industry. For example, the Novi Equipment Company, Novi, Michigan, cut service repairs costs 85% on auto air conditioning units after adopting the Type H-1 Leak Detector as a standard item in repair kits. Novi Equipment Company has equipped each of its factory installation centers with G-E detectors.

Testing Facility in Field

The compactness, portability and rapid response time of the General Electric Type H-1 Leak Detector have given the Georgia Power Company an on-the-spot method of determining leaks in the sealing of network protectors. Performance reports from this utility indicate an appreciable reduction in testing time and costs. As long as 110-volt a-c current is available, you can reduce your testing time and costs by using the General Electric Halogen Leak Detector (Type H-1) for testing all your field equipment. The Type H-1 detector will locate leaks in any system which contains a halogen compound, or into which such a compound may be introduced as a tracer gas. The detector body contains an element that is extremely sensitive to halogen vapors. A suction fan in the body of the detector pulls a continuous air sample through the sensitive element.



Cells Economically Tested

Another application of the Type H-1 Leak Detector is shown by North American Aviation Company where the General Electric detector is a reliable aid in assuring leak-proof fuel cells. At North American, each cell is inflated with a mixture of air and carbon tetrachloride. The cells are then given a thorough, careful inspection with the G-E detector. The G-E detector weighs only 24½ pounds, is easily carried along the assembly line. In addition, the G-E detector is extremely sensitive, requiring only the minimum testing time. The accuracy and quality of the Type H-1 detector's test are demonstrated by the fact that only a spoonful of the tracer is required to test the entire cell!

Progress Is Our Most Important Product

GENERAL ELECTRIC

Pressurized Cans Tested

Another General Electric detector designed with cost savings specifically in mind is the Fixed-head Leak Detector. Continuous production line testing of pressurized cans is now possible with this new detector. Intended for use by manufacturers of insecticides, hair lacquers, paints, plastic sprays, shave lathers, shampoos, etc., the new unit accurately leak-checks every can on the line. This 100% leak test helps protect product quality throughout its shelf life, and complaints and returns caused by deterioration on dealers' shelves can be sizably reduced. This new method is more sensitive, less expensive, and faster than conventional "hot water" methods. It eliminates manual testing of cans and enables you to initiate automatic rejection of faulty cans. Operation of the detector requires no special skill, little employee training.

Ultimate in Leak Sensitivity

The third General Electric leak detector, the Type M-2 Mass Spectrometer Leak Detector, is designed for leak-testing vacuum systems or pressure systems. The Type M-2 detector will locate leaks as small as 1×10^{-10} standard cubic centimeters of air per second, a leak rate so small that more than 5000 years would elapse before one cubic inch of air at atmospheric pressure would leak into an evacuated vessel. Manufacturers of components for atomic energy equipment, refrigeration and air conditioning systems, and electronic devices—industrial tubes, semiconductors, and hermetically sealed components depend on this extreme sensitivity to assure meeting specification requirements. Rugged industrial construction, simplicity of design, and use of plug-in type components make the General Electric device easy to operate and maintain.

Quantitative Leak Measurement

Accurate determination of leak size is now possible by calibrating the H-1 Leak Detector with this new standard. Once maximum quality control leak limits have been established they are accurately maintained by using the Leak Standard as a dependable reference. Portable, ruggedly constructed, and adjustable, this instrument enables you to maintain a new high in control of leak measurements. For further information on G-E's Leak Detection equipment call your General Electric Apparatus Sales Office or write Section 585-42, General Electric Company, Schenectady 5, New York. *Remember, accurate leak detection means profits.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

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(Advertisement)

TIPS ON TRUCKS

Records show electric trucks cost less to maintain

Electric trucks . . . or gas trucks? Which should you choose? Which should you use?

Where a choice of gas or electric trucks exists, it is wise to choose the electrically powered type. Facts show that except under the most abnormal conditions of outdoor operation, and where the trucks will be subjected to excessive abuse, your electric trucks will outperform the gas trucks practically every time.

Wherever records have been kept, it is interesting to observe that electric trucks, on the average, are available for duty longer. Downtime with electrics is held to a bare minimum. According to the logs, downtime and maintenance costs for gas trucks run two, three, even four times that of electrics.

The right type battery can make a big difference

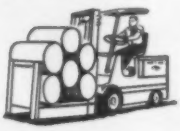
An electric truck is built to deliver more value per dollar—right from initial purchase, through every day of its long worklife. But to get the most out of the modern electric truck, it takes a modern "power plant" as well.

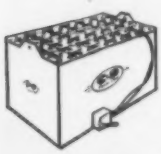
For best all-'round performance, it pays to match the better truck with the better storage battery—C & D. Here's an advanced-type storage battery built by the company which pioneered the modern storage battery. C & D *Slyver-Clad*® batteries virtually eliminate 'shedding' as a determining factor in battery life . . . are designed to give a minimum 10 percent greater capacity in standard size trays.

(*Send for the literature offered in the advertisement at right.*)

For peak performance . . .

match the best in trucks — electric





. . . with the best in batteries—C & D.

U. S. Air Force Heavy Press Plant operated by Kaiser Aluminum, Halethorpe, Maryland.

Log many miles, low maintenance, lugging aluminum "logs" to press

Trucks all electric . . . batteries by C & D

Modern is the word for Kaiser Aluminum's operation of the impressive new Air Force Heavy Press Plant here in Halethorpe, Maryland. Modern right down to materials handling!

It's a continuous haul, back and forth, from billet casting to the huge extrusion presses. The fleet delivers tons of aluminum every day. But power-packed C & D *Slyver-Clad*® batteries — the advanced-design truck batteries that give you a minimum 10% *extra* capacity in standard-size trays—provide power to spare during the full 8-hour shift.

It's true! Trucks work longer . . . stronger . . . with C & D batteries aboard!

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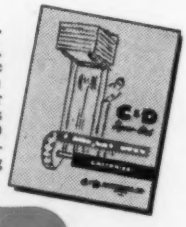
Why C&D? Write for—
New Bulletin IT-524/56. Tells you how to get more work—through more battery—from all your electric trucks. Shows you why advanced C & D principles and construction keep handling costs down.



C&D BATTERIES, INC.
of Conshohocken, Pa.
Since 1906
Sales and service offices in principal cities from coast to coast

PLANT ENGINEERING
September, 1957

What's Just Ahead in This Issue?

PRODUCTION goes on its merry way at Douglas, when the painting crew is working overhead, thanks to the ingenuity of their plant engineering department. They have come up with a hot spray painting unit which causes any over-spray to fall as harmless paint dust. To see just how this unit operates, turn to page 102.

SICK of high heating costs on storage tanks that must be heated? Heat loss can cost you a pretty penny. These costs can be lowered by applying insulation plus a galvanized sheet metal "raincoat". This has paid off for one company. See page 120.

WHAT'S the number one source of direct current in industry? Rectifiers— silicon and selenium—are challenging motor generators for the lead. For one thing, higher light-load efficiencies make rectifiers particularly well-suited to intermittent load applications. The article starting on page 96 gives comparative cost analyses, relative sizes and applications for your plant.

HOW many time have you asked yourself "Which floor preservative should I use?" This same question has been asked of the maintenance staff at Allis-Chalmers Mfg. Company. They found the answer by conducting tests on various floor preservatives. Page 99 tells you how these tests have helped them in the selection of floor preservatives.

MORE EFFICIENT, higher-level illumination—this is the goal of plant engineers in industry. To achieve this goal, try 400 cycle lighting, instead of conventional 60 cycle. You can reduce your total annual cost for lighting by 10 to 15 per cent with a high frequency system. An economic analysis of a typical industrial plant is included in the article starting on page 124, which gives the lowdown on high-cycle lighting.

DO YOU RECORD steam pump repairs in your plant? Can some of the maintenance cost be cut by design changes? Do you have stock end valve and piston problems? In a Lever Brothers Baltimore plant they tackled just such a situation involving about 100 pumps and came up with paydirt. To find out what was accomplished, see page 104.

DAMAGED glassed steel equipment calls for special repairing techniques. The author discusses several techniques which will help you with on-the-spot field repairs. Included is a step-by-step description of what you should do when installing a three-piece repair plug. This article begins on page 111.

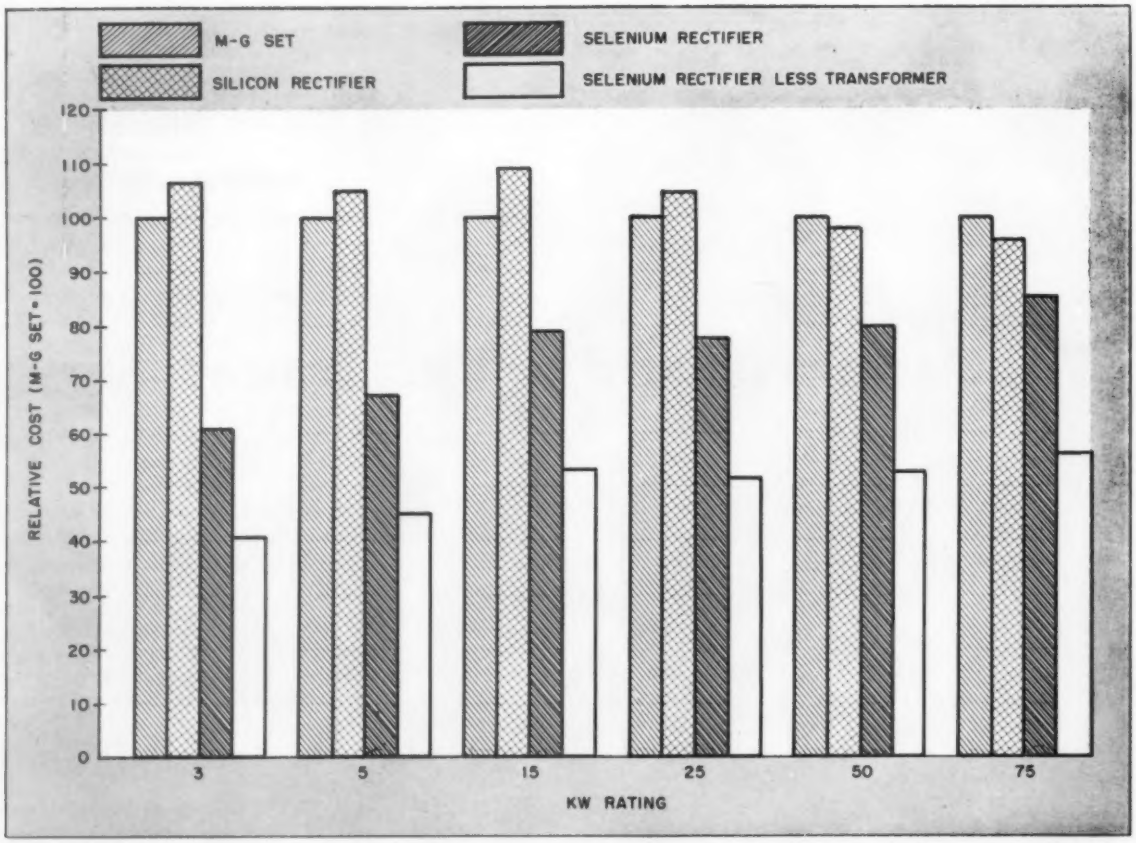


Fig. 1. Relative first cost of m-g sets and selenium and silicon power rectifiers based on a d-c output of 250 v two wire

Power Rectifiers--Which One for You?

Author Evaluates Available Types To Help You Choose

By E. J. LAUGHLIN, Manager Metallic Rectifier Sales, Westinghouse Electric Corp., Buffalo, N. Y.

DIRECT CURRENT POWER REQUIREMENTS continue to grow with industrial expansion. To keep pace, means for converting a-c to d-c are changing and improving. New silicon and germanium conversion equipment is now available, in addition to the well known selenium power conversion units.

Increased use of semiconductor rectifiers has made d-c distribution systems practically obsolete. New a-c distribution systems are designed to deliver power efficiently virtually everywhere. It is logical to benefit from them by using local power conversion units wherever d-c is required.

Generally, the equipment that best meets modern conditions is the semiconductor rectifier. It may be the selenium type, which has been in use for over 15 years, or more recent versions of the semiconductor rectifier, silicon or germanium units. For medium d-c voltages any of these types may be used. Silicon is generally preferred over germanium because of its high inverse voltage rating and its ability to operate at higher ambient temperatures.

Determining Factors

Selecting a suitable d-c power supply for machine tools requires consideration of several important factors. Seven major points are: application; original cost; installation cost; maintenance expense; space and weight; quiet operation; and efficiency and light load losses.

Most applications of conversion equipment in the machine tool industry involve d-c motors, magnetic chucks, solenoids, and dynamic braking. Of these, meeting power requirements for d-c motors is doubtless the most pressing problem.

Speed control requirements often dictate the choice of a power supply. For constant-torque, variable-voltage types, the m-g set is still predominantly used particularly for applications above three horsepower. If the application requires constant horsepower and speed control by adjustment of the d-c shunt field, then a local selenium or silicon rectifier is likely to be the answer.

Where overhauling loads occur, such as in elevator equipment or for high inertia loads connected to a d-c motor, dynamic braking control is available to work with the static rec-

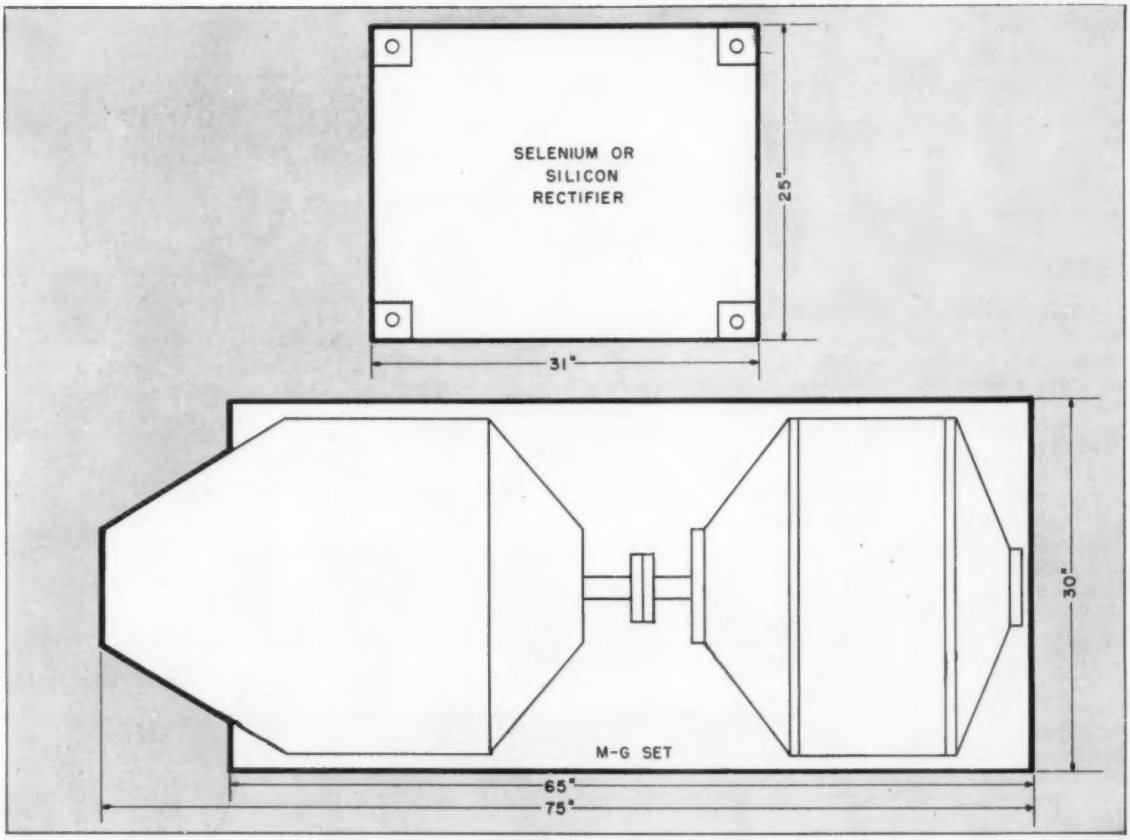


Fig. 2. Floor space requirements for 50 kw semiconductor rectifier are 40 per cent less than required for 50 kw m-g set

tifier to absorb this regenerated power. It cannot flow back through the rectifier.

Comparative cost of m-g sets and various type of semiconductor rectifiers are shown graphically in Fig. 1. It is seen that the cost of selenium types is from 66 to 86 per cent of that of corresponding motor-generator sets. Although a comparison for only a few sizes can be shown, data for sizes falling between those listed are comparable. Rectifiers are purchased as packaged units that require no external control. Optional items such as instruments, a-c and d-c breakers, and indicating lights can be added to the package at a nominal cost.

Introduced into this new lineup is a new unit costing less than half the price of m-g sets in most sizes. It is a selenium rectifier designed to operate directly from a 208/120-v, three phase, 60 cycle network without the use of a transformer. Direct-current output is approximately 255 v, two wire. Although these units are not likely to be widely applicable, because there is no way to adjust the d-c output, they do represent a low-cost means of power conversion wherever 208-v a-c power is available.

Costs of silicon rectifiers are currently above those of selenium mainly due to the added protection that designers feel is necessary with d-c motor loads. As experience is gained, this cost is certain to come down.

Packaged rectifiers are the least expensive of all types of power conversion equipment to install. They require no foundation and do not need to be bolted down. There is no leveling or lining up to be done and they are easy to move from place to place with a fork lift truck or any similar means of handling. Since there is a continual effort in all plants to secure better use of existing equipment and increased production, users welcome a power supply that can be easily moved from place to place and installed off the floor entirely.

Fig. 3. Three small fans replace large one, reduce noise from 100 kw rectifier

Installation

Power units are set for their nameplate voltage at the time of manufacture. Installation requires only the connection of a-c leads to the rectifier and the two d-c leads to the load. When the a-c supply voltage is higher or lower than the nameplate rating, taps are available for setting the d-c output at the desired value. On standard units, limits of a-c voltage setting is plus or minus 10 per cent of rated supply voltage.

Maintenance is an item that requires the strictest consideration. Rotating m-g sets invariably require the greatest amount of attention while

Table I. Comparing relative merits of m-g sets, selenium and silicon rectifiers

REQUIREMENTS	RELATIVE MERIT		
	Selenium	Silicon	M-G Set
Fixed voltage	1	1	2
Variable voltage	2	2	1
Original cost	1	3	2
Installation Cost	1	1	2
Maintenance expense	1	1	2
Space and weight	2	1	3
Quiet operation	1	1	2
Efficiency	2	1	3

static rectifiers require the least. Rectifiers installed in a reasonably clean atmosphere will operate year in and year out without any maintenance. When the atmosphere contains dust or dirt, it is well to clean the unit periodically with an air hose. Although filters can be applied to keep out much of the dirt these often become clogged to the point that air flow is restricted.

Floor space is at a premium in today's plant and any significant saving is of great value. Comparing a 50-kw rectifier unit to an equivalent m-g set, Fig. 2, we see that the rectifier occupies a space measuring 31 in. by 25 in. or less than five and one half square feet. The m-g set takes up almost three times as much space. The bedplate alone is 65 in. by 30 in. or two and one half times as much area as the rectifier.

Comparison can also be made for the net weight of each. This is important on rectifiers because very often they are best mounted on a shelf or mezzanine floor, out of the way. Again comparing a 50-kw rectifier with an equivalent m-g set, the net weights are 2700 lb for the m-g set and 1600 lb for the rectifier. In this case, the rectifier is less than 60 per cent of the weight of a conventional m-g set.

Quiet operation is an objective that receives increasing attention. Noise levels in most factories are high and any measure that can reduce them is welcome. In Fig. 3 we see the internal fan arrangement for a 100-kw unit. By including three small fans rather than one large one, we not only improve reliability but we also gain quietness. Since the fans are mounted inside with the blades away from any screened opening, air is brought in at the front of the unit where it is reasonably free from dirt.

Attention is now being directed toward efficiency, particularly since silicon and germanium rectifiers have come into the industrial picture. The silicon unit installed on the boring mill seen in Fig. 4 has a full load efficiency of 90 per cent. At half load, efficiency is about 92 per cent and remains high down to about one-quarter load. This 50-kw, 250-v silicon unit is typical of adjustable-speed, constant horsepower motor applications.

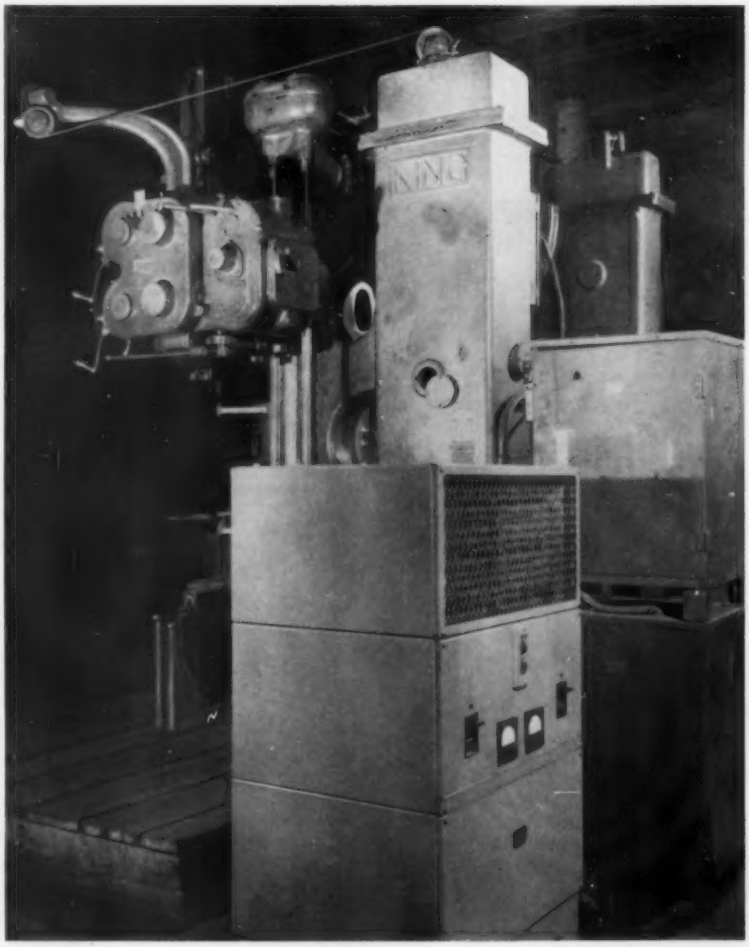
Light load efficiency of rectifiers is most important since in a normal day, a power supply operates frequently at no load or light loads. Rectifier no-load losses are usually less than half those of m-g sets, for both silicon and selenium type power supplies.

Power rectifiers are well suited to applications involving widely fluctuating loads. They can handle momentary peak loads far above their rated capacity without damage. The inherent high efficiency of the power rectifier under all load conditions results in a higher all day efficiency. Installation, maintenance and reliability are similar to dry type transformers.

Packaged units, located near the utilization equipment, reduce losses due to transmitting low voltage direct current throughout the plant. The units are compact and lightweight and require no foundation. They are easily moved and set up when production needs result in decreasing load in one area and increasing load in another.

Summarizing, we have constructed Table I to indicate relative strengths and shortcomings of the three types of power conversion equipment. By assigning ratings of 1, 2, and 3 to indicate the ability of each type to meet major user requirements, we obtain an interesting though admittedly arbitrary evalution. A rating of 1 indicates the best performance currently attainable. It is interesting to observe that it awards six "firsts" to silicon equipment, five to selenium, and one to the m-g set. END

Fig. 4. Silicon rectifier supplies 50 kw 250-v d-c power to a large boring mill



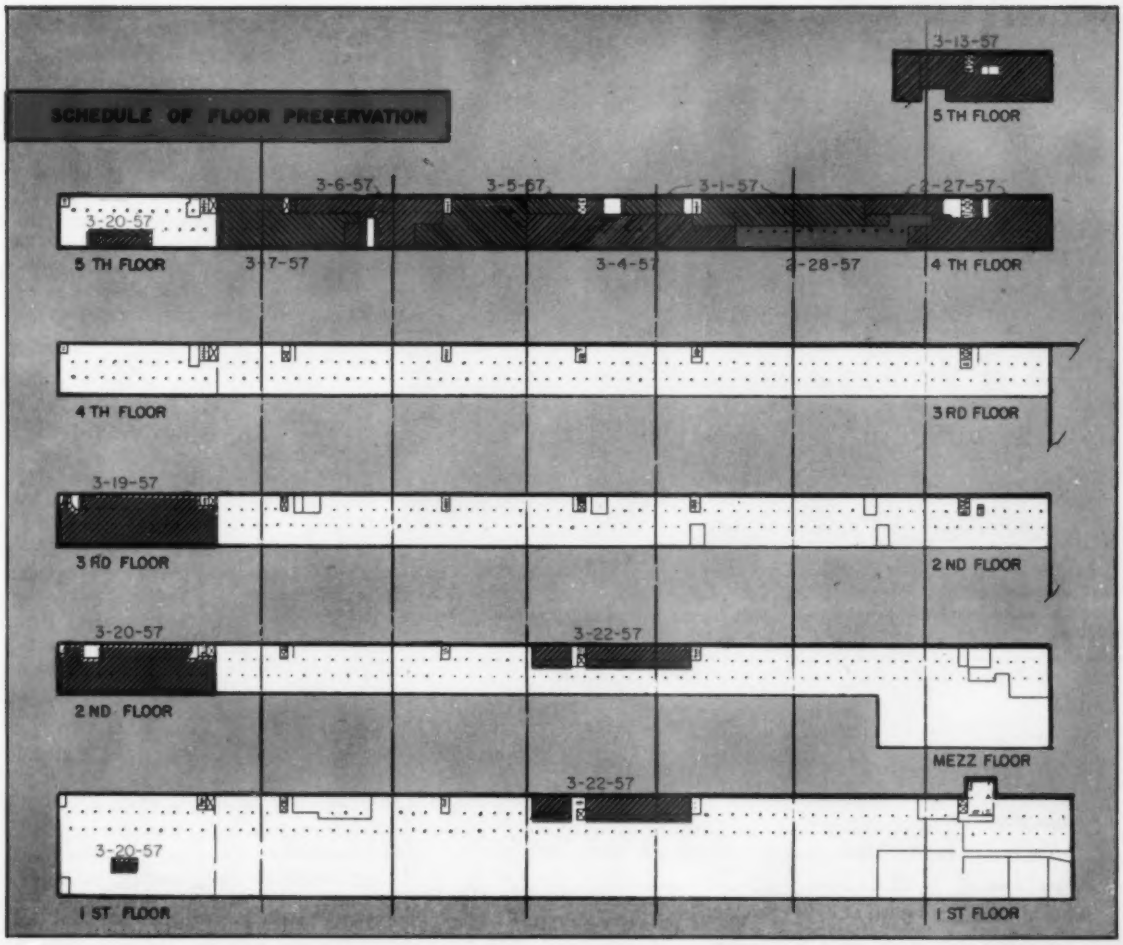


Fig. 1. This floor chart helps the maintenance department keep a constant check on the progress of floor moppings and re-preserving activities. Dates in the colored areas indicate when the floor preservative was applied. Most of the floors in the building consist of battleship linoleum and tile with the balance of the floors consisting of sealed maple wood

Allis-Chalmers Conducts Tests To Find Out

Which Floor Preservative Will Do?

By RALPH W. WOIDA, Superintendent of Building Maintenance, Allis-Chalmers Mfg. Co.

IT IS GENERALLY conceded that proper preservation of office floors, be they of composition materials or wood, is essential in minimizing wear while helping to retain their original appearance as long as possible.

Selection of the best floor preservative for any given area can sometimes pose a problem. To meet varying floor and traffic requirements, various wax base, water emulsion and solvent types of preservatives are available.

At Allis-Chalmers West Allis Works the aim has been to effectively and economically preserve its more than 600,000 sq ft of floors in office areas through the use of a preservative least likely to result in slipping accidents.

Two years ago, following a number of tests, the company started using a water emulsion resin floor preservative. Prior to that time, an average of four slip accidents—half of them resulting in lost time—occurred annually in the firm's main office building. Since the adoption of a water emulsion resin floor preservative, no slip accidents have been experienced.

It is felt that this added safety factor is important even though the use of resin dispersion products has resulted in somewhat lower wear qualities.

The first water emulsion resin product tried at the plant was applied on asphalt tile in an area of about 1,000 sq ft. This space was chosen because of its varied traffic exposure. It was adjacent to an elevator, it included a central aisle, an access aisle to private offices, and a normal office section where foot and chair wear could be observed.

Since the material was not miscible with wax, we did a thorough stripping job, using a conventional floor machine equipped with scrubbing brushes and a good de-waxing agent. The floor was cleaned and left to dry thor-

Fig. 2. A water emulsion resin preservative is applied to the linoleum corridor. Maintenance will report on the condition of the preservative after a trial period

TEST REPORT

General Identification Floor Preserver

Date of Purchase: 3-2-55

Name of Product: _____ _____

P.O. Number and Quantity: Sample - 1 Gallon

Price: 1 Gal. $_____ (55 Gal. lots $_____)

Supplier: _____ Chemical Co.

Estimated Area Coverage: 2,000 sq. ft. per gallon

Instruction for Use: Strip thoroughly, removing all waxes, rinse with clear water. Floor must be clean and dry. Allow 24 hours drying time after wax stripping operation. Apply first coat liberally, using a mop or applicator. Allow at least 30 minutes drying time before second coat application. Daily maintenance -- use dust mop.

Safety Service Comments:

The Hygiene Section of the Safety Service Dept. has evaluated the use of the subject product and an analysis of the compound reveals no health hazard. NOTE: Qualification - This material has not been evaluated from the anti-slip point of view.

Date in Use: 3-2-55

Department No.: 1140

Location and Type of Area:

Asphalt tile at West end of maintenance office area, simulating all traffic conditions - light, medium and heavy.

Test Data:

3-3-55 - Floor colors excellent. Lustre good.

3-4-55 - Obvious scratching in heavy traffic area main aisle. No objectionable results in other areas.

1 week - Test for stripping - 8 oz. detergent to 5 gals. water - damp mopped. Product is easily removed.

2 weeks - Lustre fair, no scuffing, scratching very apparent.

3 weeks - Area could stand re-application of preservative.

NOTE: This floor has been maintained only with sweeping brush.

After next application, use treated dust mops and review results as before.

Fig. 3. This test report was filled out by maintenance people on each type of floor preservative tested. Here is a completed report on one of the tests

oughly until the following day when the area was damp mopped and the preservative applied in two thin coats about 30 minutes apart. While floor colors were prominent after applying the first coat, luster was lacking. However, after the second coat was applied, both color and luster were greatly improved.

After applying this preservative, two area supervisors were assigned to inspect this floor space alternately every other night and submit a report as to their opinions on such conditions as scuffing, scratching, extent of wear, etc., for a three-week period.

Based on the result of this test, we proceeded to apply this preservative material on a linoleum covered floor and subsequently on a sealed wood floor. The cumulative results led us to use the preservative through an entire building with very good results.

A building drawing of the floor areas permits us to check the progress of floor mopping and re-preserving activities. This record revealed that three weeks were required to complete the application of a former type of floor preservative as against only five days when applying resin dispersion products.

While instructions accompanying the application of these products state no stripping is required until about six applications, we found that four applications before stripping give the best results. With this procedure, excessive time is not required to remove buildups and a better appearance results.

Periodic damp mopping between applications, depending upon area conditions, should be done with a minimum of detergent. In the case of some of these products, machine buffing will add to the luster after a damp mopping.

Not only has use of resin dispersion floor preservatives afforded greater safety but it has permitted more efficient use of our maintenance employees because the preservatives can be applied more rapidly. In addition, we have been able to improve the appearance of our floors for less money by reducing material costs since detergent and de-waxer requirements have been cut by about one-third.

List of Manufacturers

If you would like a list of some of the manufacturers of resin dispersion products, kindly indicate "Resin Dispersion List" on the post card in this issue, or write to Editor, PLANT ENGINEERING, 308 East James Street, Barrington, Illinois.

These three radiant heaters, located 10 ft above shop floor level, deliver 300,000 Btu's to keep the employees warm despite low ambient temperatures

Radiant Heat Warms Drafty Tool Shop

WHEN YOU completely change the air in shop space at the rate of once every 1.76 minutes, and when the replacement air is drawn in from outside, employee comfort is very liable to suffer during spells of inclement weather. No economically feasible method of conduction or convection heating, it seemed, could cope with these conditions and still maintain an optimum working temperature throughout the shop.

These are the conditions that once existed in the tool polishing shop at Proto Tool Company, Los Angeles, California, a division of Pendleton Tool Industries, Inc. Air from this shop, 125 ft by 30 ft by 16 ft in size, was evacuated at the rate of 2,040,000 cu ft per hour to assure removal of all contaminants arising from the tool polishing processes. Replacement air from the outside was drawn in through ventilators, open doorways, or both. This rapid exchange made it practically impossible to maintain a comfortable shop working temperature during cool weather.

To remedy this situation, Jim Weeks, Proto Tool Company's plant engineer, decided to install radiant heating. Due to its similarity to visible light wave propagation, radiant heat is not affected by the ambient temperature of the air through which it passes. Its effects are not noticeable until it strikes a solid object which will absorb it, thus releasing its heat energy.

Radiant Heaters Solve Problem

Three gas-fired radiant heaters were installed at a fixed height of 10 ft above floor level along the length of the shop. The 10 ft high installation level was determined by the angular placement of the deflecting vanes on each heater. Precalculation determined that when installed at this level, the vanes would reflect the radiant energy over entire floor area of shop.

Each heater, with an input of 125,000 Btu, delivers approximately 100,000 Btu, and is thermostat-controlled. No blowers or other air-circulating apparatus are required as the radiant energy, traveling at the speed of light, provides its own propagation.

Now, even though it is cool outside and the doors are open, allowing a cold wind to drift through the shop, when the radiant heaters are operating, all shop machines are warm to the touch. The same warming effect is obtained on the clothing and skin of all employees exposed to the radiant energy.

The best recommendation for this radiant heating installation comes from the shop employees themselves. "They love it!" Jim Weeks says, "And that's a mighty important working attitude to maintain during finishing operations on high quality hand tools!"

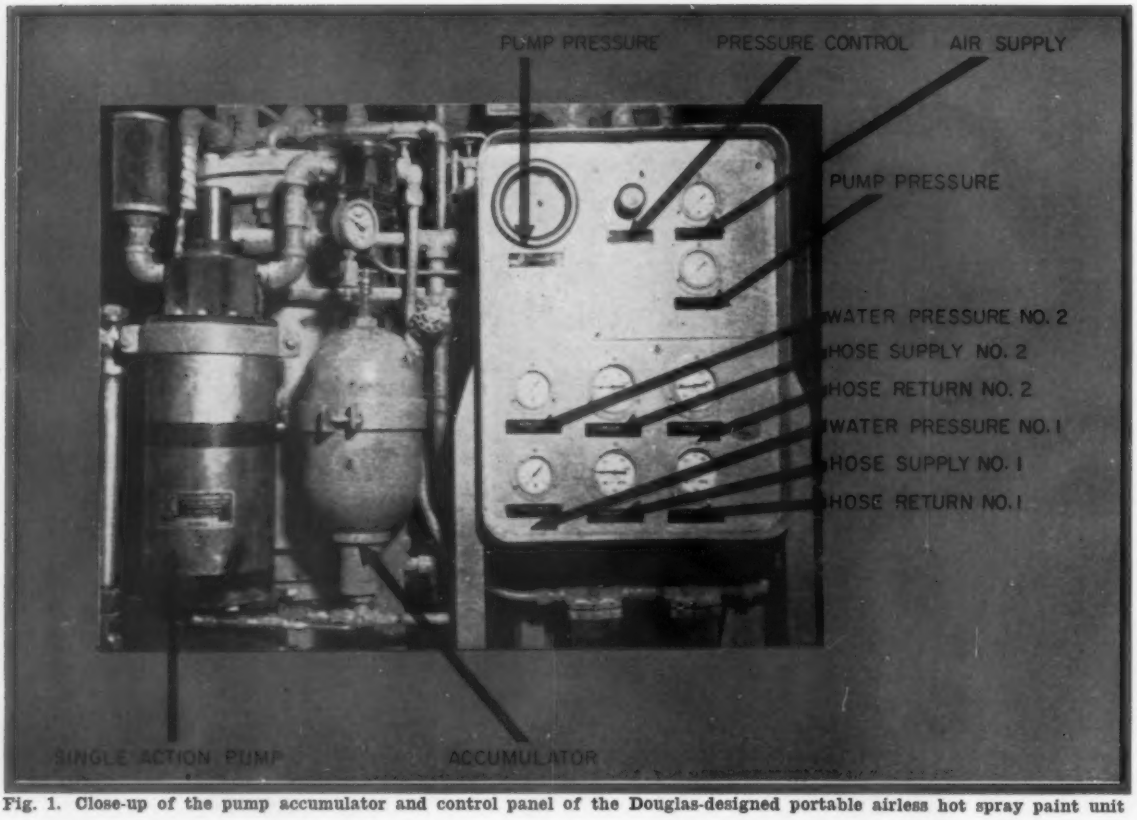


Fig. 1. Close-up of the pump accumulator and control panel of the Douglas-designed portable airless hot spray paint unit

Plant-Designed Airless Hot-Spray Painter

Maintenance Painting Conducted With No Production Stop

By R. B. PAYNE, Mechanical Engineer, Plant Engineering Department
El Segundo Division, Douglas Aircraft Company

A COMPANY-DESIGNED and developed portable airless hot spray painting unit is doing yeoman duty at the El Segundo Division of Douglas Aircraft Company in maintenance painting work. With this unit, painting may progress in or over a working shop department without affecting the personnel nor the operating machines in the department.

Solvent or thinner odors are practically nil. Any slight overspray or bounce spray that occurs falls in the form of a harmless paint dust less than 6 ft from the paint gun nozzle. A loosely flung or hung drop cloth directly beneath the operating paint gun to gather this dust is all the protection that is necessary. Wet paint spatter and spotting have been virtually eliminated.

Secret of this operation lies in the design of the equipment and the type

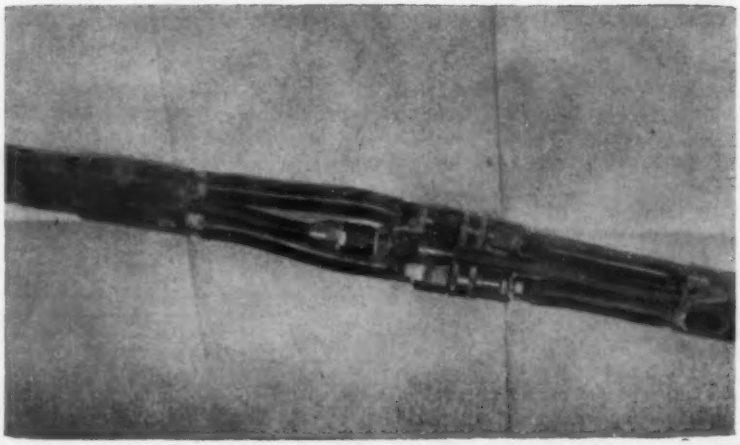


Fig. 2. Three-channel hose leading to the paint gun might be compared to a three-barrelled shotgun. Center channel carries the paint while the two outside channels carry hot water to maintain the temperature of the paint at approximately 170 F

Fig. 3. The airless hot-spray unit does not carry its own paint supply but pumps it directly from a drum carried on a trailer

of paint used. The main production building at the Douglas El Segundo plant was constructed during the material shortage era of World War II, and is entirely of wood. A highly reflective but very abrasive mill white paint is used in maintenance painting work. Several commercially available hot spray painting units were tried, but the abrasiveness of the mill white paint as it circulated through the hoses and past the heater, and through the pump, cut the life of these units to an uneconomically short span. On one machine, the abrasive mill white paint ruined the pump in 20 minutes.

With this background information to go on, the Plant Engineering Department decided to design and construct a hot spray painting unit that could handle the abrasive mill white paint as well as other types. In the Douglas unit, the paint does not circulate continuously past a heater to maintain its temperature. Instead, a three-channel hose leads to the paint gun.

Paint is contained in the central hose channel where it remains under a static pressure of from 600 to 700 psi except when it moves slowly forward to be ejected from the paint gun nozzle. The two outside channels of the three channel hose carry circulating hot water at from 180 F (entrance temperature) to 160 F (discharge temperature) to maintain paint temperature at about 170F. No air is mixed with the paint prior to spraying. Atomization is accomplished mechanically by the design of the paint gun nozzle orifice.

Design of the machine itself was aimed at supplying the necessary temperatures and pressures at the point of the three-channel paint gun hose connection. The unit does not carry its own paint supply, but pumps it directly from a drum. A single-action air pump is used to build up the necessary 600-700 psi paint pressure. This pump works in conjunction with a pressure accumulator so that constant paint pressure is maintained during the powerless portion of the single action pump cycle.

From the pump, the paint feeds into coaxial or double-walled coils immersed in the hot water tanks. The paint flows between the walls of this coaxial coil while hot water flows through the center channel and surrounds the coil. This assures quick and even heating of the paint "from both sides," so to speak, to the necessary 170-deg temperature by the time it reaches the paint gun hose connection point.

Water in the tanks (distilled water is used to minimize corrosion problems) is heated by 440-v immersion-type-heaters and pump-circulated through the paint gun hose. The unit is equipped with an instrument panel so that all temperatures and pressures are visible at a glance. Sediment and water traps as applicable are install-

(Continued on page 272)

Fig. 4. Note dense, clearly-defined spray pattern delivered by special gun nozzle

Steam Pump Improvement Program

Stock End Valves and Pistons Get Special Attention

By EDWARD M. BENJES, Mechanical Superintendent, Lever Brothers Co., Baltimore, Md.

IN THESE "ATOMIC" times it may seem out of date to discuss old reliable, the reciprocating steam pump. But gold is where you find it, as the saying goes; and having the maintenance responsibilities for a number of steam pumps, I found much could be done to improve service and costs.

This article deals with several maintenance improvements applied broadly to a number of pumps. Considered together, they constitute a maintenance improvement program achieved by specification changes. The changes involve rod packing and piston rods, pump pistons and cylinder liners, and pump valves.

While the idea was to obtain better maintenance costs, this result should not be obtained to the detriment of operating costs, service, or depleting capital value. The following figures, for a typical pump, are given to establish values, in dollars, of the significant costs:

Capital Value	$1,500.00
Maintenance Cost Yearly	200.00
Steam Cost Yearly	700.00

These figures have an important significance. The capital value is approached yearly in maintenance and steam expenditures. The steam cost is a considerable item; and in a maintenance program the effects on steam usage should be considered.

Preceding figures may also stir up a thought about the influence that a larger capital expenditure for a larger pump may have on steam and maintenance cost. A pump generously sized will run slower, achieve a better volumetric efficiency, and result in lower steam and maintenance costs.

There is a sidelight to a steam-powered machine which needs to be appreciated with particular reference to steam costs. Of course, a steam pump can be viewed as a pressure reducing valve which does some work in the process of bleeding high pressure steam into low pressure steam mains. Only a small portion of the heat energy is used by the pump out of each pound of steam.

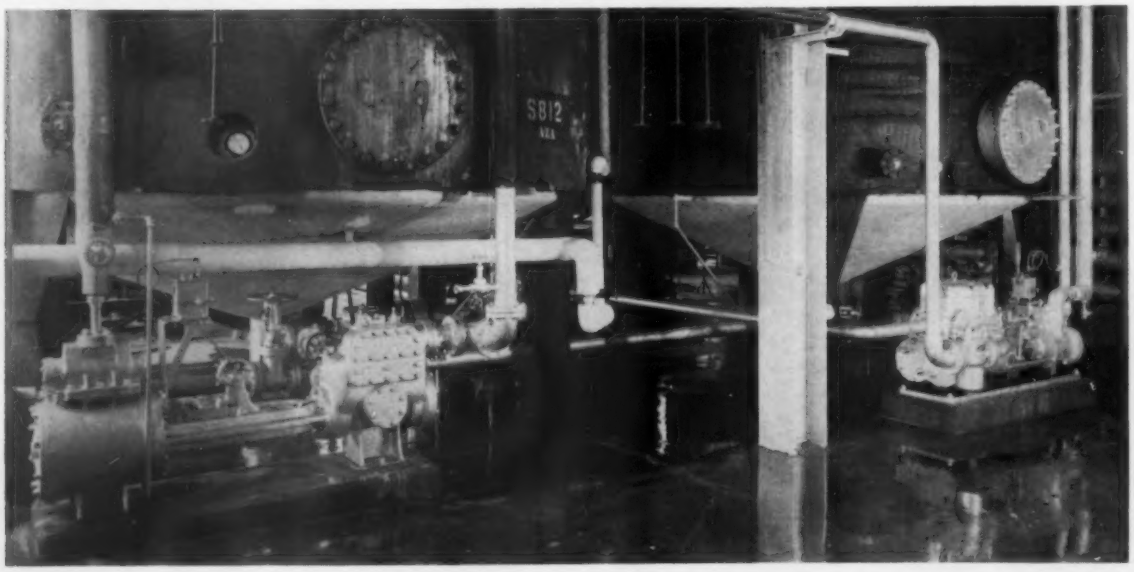
If further use of the low pressure steam is made, say on process heating, we open a problem of cost allocation, which makes way for errors when comparing costs from various plants. The figure of $700 per year for steam is based on charging all the cost to the pump at $1.00 per 1000 lb.

To give a perspective of the scope of the problem, the following figures are appropriate. About 100 pumps are involved, the number varying with the work over a period of years. New processes were added and some operations were shut down, changing the number of pumps involved. Inventory of spare parts can be nominally set at $10,000. Some 25 bbl of oil are required for steam cylinder lubrication. Routine pump packing and adjustments involve some 1200 man-hours per year.

Among the first steps taken to improve pump maintenance was the formulation of an equipment inventory. Useful data, such as serial numbers pump size, service, and rod sizes were compiled into a reference manual. A logbook was established to record the repairs made and to note particular methods of repair or materials used. See Fig. 2. A separate effort involved pump valves, which will be dealt with subsequently.

The most obvious and irritating problem is leakage of the pumped product at stuffing boxes. Product loss and the resulting messy conditions made the effort to improve rod packing a natural contender for early action. There is an inseparable relationship between rod packing and the pump rod. As the rod wears or becomes rough-

Fig. 1. Simplex pump on the left and the duplex unit on the right are used for chemical unloading and transferring



MAINTENANCE ACC:

ALTERATIONS ACC:

DESCRIPTION: Paste Circulating Pump

ASSET NUMBER:

PARTICULARS:

REQ. NO.	DATE	DESCRIPTION OF WORK DONE	M.	HRS	S. I.	LABOR	O. CHARGES
1676	12/4/52	Open drain line under paste pump piston trough	9	5.0	—	11.40	
2235	11/11/52	Check & repair paste circ. pump	9	10.0	24.80	22.80	
2301	11/11/52	Check & repair	9	8.0	57.70	18.24	
2463	11/1/52	Repaired pump	10	12.0	32.91	27.36	
1229	4/21/53	Repack paste pump in S. D. Tower					
141	1-18-55	Make repairs to				1.0	2.66	10.00	
958	4/18/55	Check Paste Circ. pump & repair	3	10.0	28.92	25.18	
1137	5-2-55	Repair paste circ. pump	4	10.0	108 1/3	25.81	
1411	6-27-55	Make repairs to paste circ. pump	6	11.0	47.89	27.74	
7265	10-13-55	Unplug drain line from paste circ. pump					
6824	8-7-56	Install steam separator on paste circ pump 5th & 6th floor penthouse	8	33.0	197	88.55	10.30
911	4-17-57	Check stock end of paste circ pump					

Fig. 2. Page reproduction from logbook that also includes such information as pump and rod sizes and serial numbers

ened, packing life decreases. If a rod is used which resists wear or corrosive action, rod life is improved, and packing life, also.

Rod packing was changed to the Chevron type, see Fig. 6, supplanting conventional braided square packing, and pump rods were specified of type 316 stainless steel. One grade of Chevron packing was selected for general use in the interest of standardization.

To use up supplies and parts on hand and to allow troubles to be found should they develop, the change was made gradually. The decision to use Chevron packing was based on observed good results of several prior applications. The decision to use type 316 stainless rods was made to exclude corrosive effects, rather than for wear resistant properties. There is something to be desired of stainless from a wear standpoint, but economics precludes the use of more costly coatings.

For more than six months a particular pump was observed where the gland position remained as it was originally set. No adjustment was made during this period, and product leakage was minimal. One group of pumps in difficult service averaged two repackings per year.

Difficulty with pump valves is not as easy to spot as a leaking stuffing box. Valves can be in very poor condition for considerable periods; the result is inefficiency, not failure. They are more complex; several parts are involved for each valve assembly, and there are four or eight valve assemblies per pump for simplex and duplex types, respectively.

Examination of our inventory of valve parts showed 110 classifications, some with only minor variations and some with actual duplications. One particular valve design, which was in limited application for some time, appeared to give better service, in the opinion of pump mechanics and supervision. This valve is manufactured by a company that specializes in pump valves. A study of the valve design was made with a representative of the manufacturer.

An inventory of valve parts was composed, standardizing on the one design for all pumps. This disclosed that the 110 classifications of valve

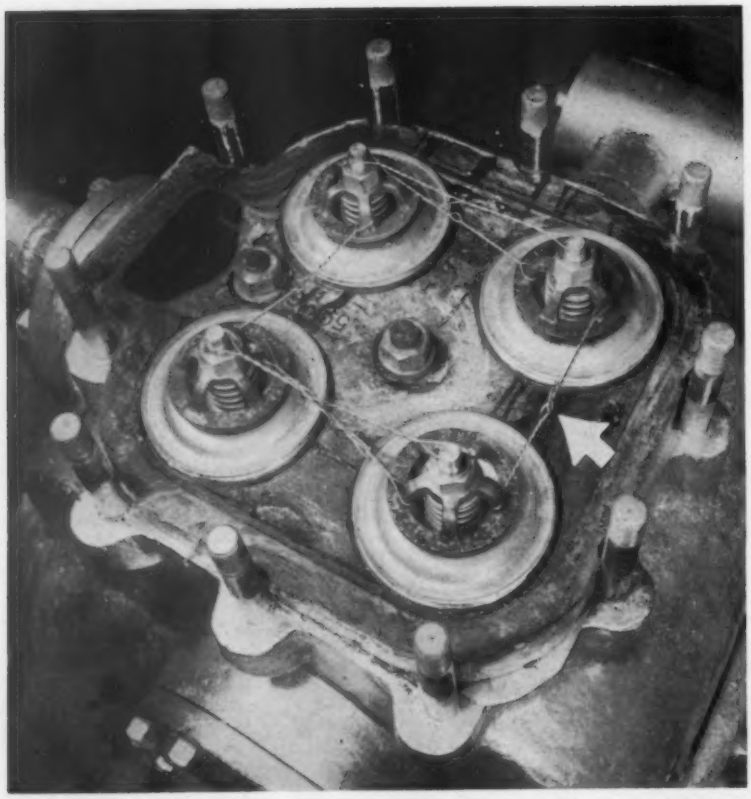
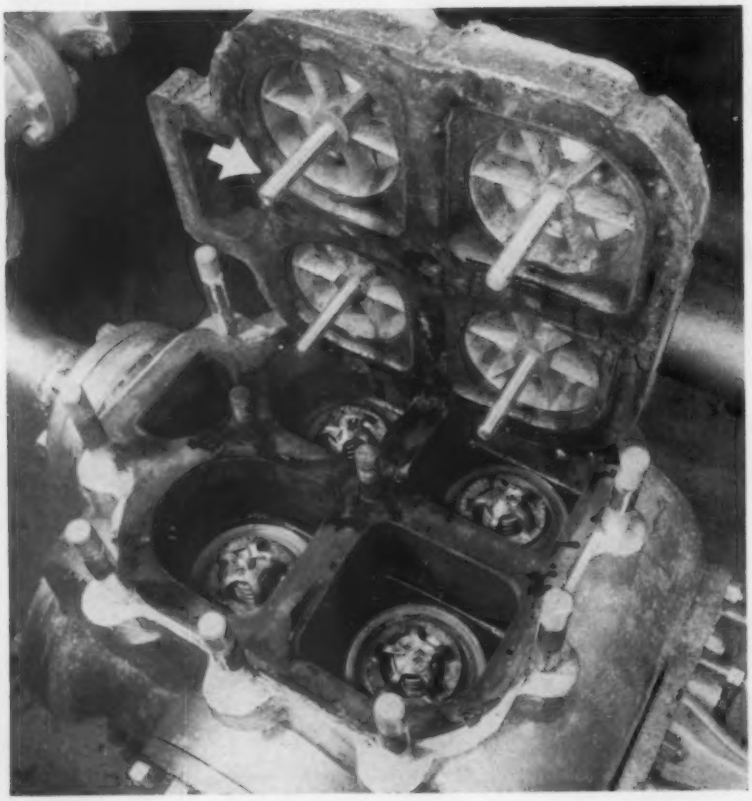


Fig. 3. Use of wire lacing helps to prevent valve assemblies from loosening

Fig. 4. Valve assemblies are restrained also through usage of hold-down bolts



parts could be reduced to 44. A trial order of one each of the 15 sizes of valves was entered, and each part checked for accuracy before the complete inventory of new valves was obtained. An arrangement had been made with the supplier that each part would have an identification number marked on the piece to expedite the job of getting the proper valve parts into the proper pump for receiving clerks, stores attendants, and pump mechanics.

Use of Parts

A policy was adopted to govern the procedure of applying the new standard valve to pumps in service. A considerable sum was invested in the old inventory, but it was desirable to get the advantages of the new valve promptly. It was decided to use old parts for day-to-day repairs and reserve the new parts for major overhauls, until such time as the old inventory was exhausted.

The gradual approach would allow any inherent difficulty in the new design to develop in small volume, and corrections could be adopted to future applications.

General difficulty involving either the old or new valve design concerned the loosening of the entire valve assembly in the pump casting. The valve seats were of a threaded design which is quite vulnerable to corrosion; furthermore, the only means of securing the valves in place was the tightening given on assembly. Two steps were adopted to prevent valve assemblies from loosening—the application of wire lacing, Fig. 3, and jack or hold-down bolts, Fig. 4, effectively reduced the difficulty.

While the mentioned improvements were being made, efforts were also directed to the third trouble spot—the product pumping piston and cylinder liner combination. As with valves, improper conditions are not obvious, and a pump will continue to perform with a piston and liner in a very worn state.

Piston Types

An investigation of pump pistons in use disclosed three broad designs—a piston ring type, a cup type, and a packed type. The ring type was confined to a mildly corrosive service, with cast iron being used for both piston and liners. In this service the results were always good; consequently, no changes were made in the group of pumps equipped with the ring type piston.

In some instances the cup type piston performed very well; in other cases, there appeared to be room for improvement. The weakest of the three designs was the packed type piston; operation

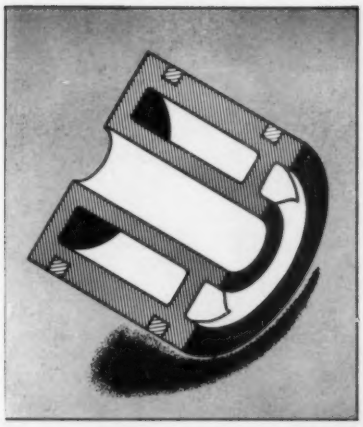


Fig. 5. Section of a ring type piston

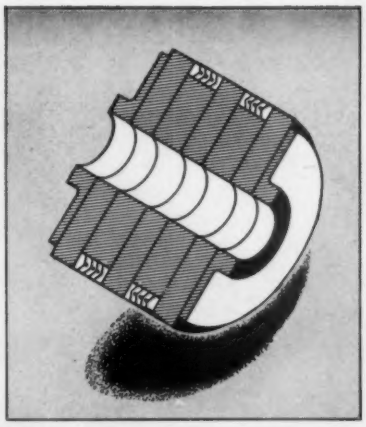


Fig. 6. Piston using Chevron packing

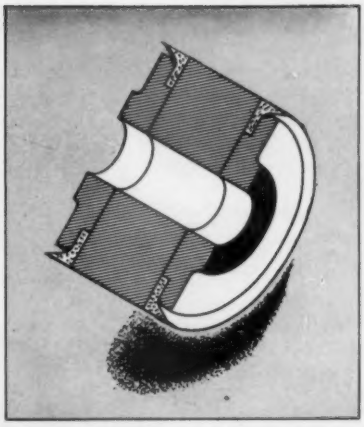


Fig. 7. Manner of applying nylon cups

service time as low as three weeks had been noted.

Corrosive pumped products and products with small lubricating value appeared to be at the root of the problem; the solution was the application of a new piston-cylinder liner combination. It was also deemed advisable to reduce the piston weight for a secondary advantage.

Primarily, it was decided the piston should have a non-metallic element to exclude metal-to-metal contact and eliminate metallic corrosion from one part. Cylinder liners were generally made of cast iron, and in some installations were of stainless steel.

Design Change

One pump was known to be in need of repair and offered an opportunity to replace a packed type piston having a massive bronze body. The pump was in vacuum service, handling steam condensate, and had a record of costly repairs. For piston replacement the cup design was selected on the basis of good results obtained in other pumps using it. This piston type would also provide the desired non-metallic feature. The pump liner of bronze was not altered, as the liner could be expected to improve with a non-metallic piston.

To push further use of non-metallic material, and also to reduce weight, the piston body was made of a canvas base phenolic resin. A weight reduction of 40 per cent resulted. This installation operated for two years and two months of trouble-free service before the cups were replaced. The liner continued to stay in service; whereas, previous repairs always required a new liner.

While the above experience was being gained, it became apparent that a comparative test on cup materials would be desirable. A caustic material pumping seemed to be particularly troublesome, it was also considered desirable to design a new type piston. Both steps were taken.

With the help of a manufacturer in selecting cups as to composition and hardness, a test was planned using a duplex pump with one cup of each specification on each end of the two pistons, or a total of four cups. Each cup was subjected to substantially identical service. It was suspected that cup failure was due to caustic action on cotton fabric; accordingly, one cup was specified to be of nylon fabric. See Fig. 7. The other materials were cotton and asbestos, hardness or stiffness of the cup being principally the other variation. The new result of the test was the demonstrated superiority of the nylon fabric cup. The nominal life of the nylon cup was four and a half months, and of the other three cups, three months.

The approach of creating a new piston design resulted in the application of chevron-type packing to a piston, the body of which was made of rubber. A single piston was made and trial runs using several grades of rubber, graphite and homogenous nylon were completed. The outstanding results of the trials were the sustained efficiency of the pump during the life of the piston and the ability of nylon to withstand caustic service.

Advantages displayed by nylon indicated that a cup design employing nylon as the material would result in a piston offering long life in caustic and inadequate lubricity service.

Figure 7 shows the design of the nylon pump cup piston. In this design, two factors were given particular attention—the growth of the material due to absorbed liquids, and the expansion due to increased temperature.

The cup was finish machined with the outside diameter left large. The dimension of the cup at this point was 6.075-in. diam. The cup was soaked in cold water for 24 hr and remeasured. The diameter grew 0.001 in. at the heel and 0.004 in. at the toe. The cup was then boiled in water for one hour and the diameter measured while hot. The diameter increased from 6.075 to 6.125 in. The cup was cooled to room temperature, and the diameter at the heel was 6.090 in. and at the toe 6.115 in.

Thus, the heel dimension grew 0.015 in. due to total absorption and 0.035 in. due to expansion by heat. The cup was then finish machined, making the diameter 0.025 in. less than the cylinder bore. The piston was placed in service, and initial results were good. Too little service experience is available to endorse the design without reservation.

While some benefit to individual readers may result from details presented, the approach taken is more pervasive. Minor errors in original specifications will always creep in, and alert maintenance will not only effect repairs, but will also reduce or eliminate the source of the difficulty by employing redesign. END

"Harry, here, is our short circuit man"

Fig. 1. View of the new warehouse shows the stainless steel panels, the green translucent plastic panels, the brick wall and the protected steel panels, lower wall, left, which all played a part in the construction

Panels Built This New Warehouse

Plastic Panels for Good Light and Stainless for Minimum of Maintenance

STAINLESS STEEL curtain walls, corrugated translucent plastic panels, protected metal curtain walls, and masonry blend together in the new offices and warehouse of A. M. Castle & Co., Franklin Park, Ill. The new building provides 400,000 sq ft of office and warehouse space.

In fact, everything possible was incorporated into this new structure to make the job of steel warehousing and distributing as efficient and practical as possible. Choice and use of materials, thoughtful layout, sound construction all contributed to an adaptable structure requiring a minimum of maintenance and repair, and promising a maximum in use and longevity.

Details of the installation of the various types of panels and some of the other construction features of this new warehouse are mentioned here.

Stainless steel for the warehouse walls is unbacked by insulation; that chosen for the second floor of the office is backed by 1½ in. of glass fiber insulation. The U factor of these insulated panels is 0.17. Uninsulated panels have a K factor of 1.2.

Erection of the unbacked stainless mansard panels is simple: the panels are fastened to girts or purlins by means of self tapping screws. Side lap fastening is accomplished with bolts, and neoprene washers. Attachment of stainless to the plastic translucent panels present no particular problems. Stainless steel fasteners were chosen for their strong corrosion resistant, non-staining characteristics.

Erection of the glass fiber-backed stainless panels was also quick and easy. These 22-gage panels are backed with 1½ in. of glass fiber insulation plus a back-up sheet of 18-gage galvanized steel. The galvanized back-up sheet was erected first by fastening to the steel girts with self tapping screws or welding. Subgirts consisting of 3/16-in. by 1½-in. steel bars were next welded to the standing seams in front of the sheets. The insulation was then put in place between the subgirts, and the stainless steel face sheet was placed over the insulation and fastened to the subgirts with stainless self-tapping screws.

Translucent mansard panels used in the walls and as skylights are glass fiber reinforced polyester resin 1/16 in. thick, nearly 33 in. wide and 6 ft 8 in. long. The color green was chosen for the percentage and quality of the light transmission, ease of maintenance and resistance to industrial atmosphere and weathering.

Installation of the plastic panels was essentially no different from the installation of the unbacked stainless panels described above except that rubber grommets were used to compensate for the differences in expansion and contraction of the stainless and plastic panels.

Protected metal curtain walls were used on the lower portion of the west wall of the building. These panels involve essentially the same construction and erection problems as the curtain walls discussed previously, except that the face sheet is a special mica and asphalt protected steel. These lower

Fig. 2. Close-up shows how stainless steel and plastic panels were fastened

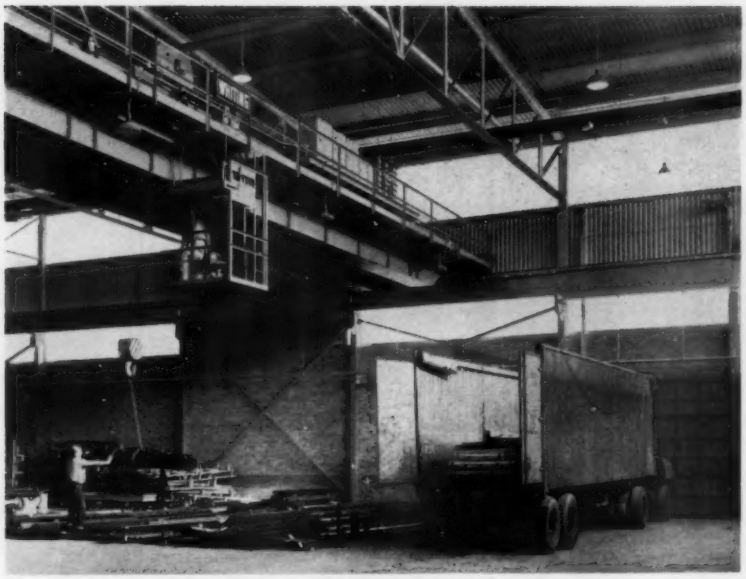


Fig. 3. Plastic panels along sides help illuminate working area. The 10-ton crane shown is one of ten used in the warehouse. Three cranes are of 20-ton capacity

west walls are considered expendable and will be dismantled whenever the company decides to expand, and then re-used elsewhere.

Several other construction items of interest are:

The roof—some 425,000 sq ft in area—is U. S. Gypsum's 20-gage galvanized corrugated steel decking over which bagasse and either an asphalt membrane or tar and gravel have been spread for insulation. There are five bays in the warehouse, four of which are 100 ft wide and one, the center, is 110 ft wide. The pitched roof above each of these bays is supported by trusses designed to use the minimum weight of steel required to carry load, and maintain proper bracing effect.

Each of the bays has two double hook traveling cranes for load and unload service. Three of the bays, including the center bay, have a 20-ton and a 10-ton Whiting crane; the other two bays are each equipped with two 10-ton cranes. All cranes are equipped with center cabs from which the operator has an unobstructed view of the steel stored in his bay.

The warehouse floor is of reinforced concrete or asphalt. It is reinforced concrete only where there is to be heavy traffic; truck lanes, etc. Where steel is to be stored or at the south end of the warehouse where the two switch tracks are located the floors are black-top.

Layout is simple: dimensions of the main warehouse are 700 ft by 512 ft. At one end of the building, toward the offices, a double lane highway can accommodate 20 trailer trucks while they load. In the center, a one lane highway accommodates up to 10 trucks unloading. At the far end, two switch tracks at grade allow 20 flat cars to load or unload.

Traffic flow is simple and orderly. A truck comes onto the warehouse service road and is weighed near the office. It then goes around the end of the building where it will enter either the load lane, the unload lane, or in emergencies the railroad siding.

The warehouse floor is kept as unobstructed as possible. There are three warehouse offices each located near the center unload truck lane and each served by pneumatic message lines. Machinery is also located near load and unload areas except for a line of shears along the west wall. This particular installation is of interest in its own right for the machines are located in front of a special pit. Cut pieces fall from the machines by means of gravity and are collected and baled in the pit, then picked up by hand trucks. Current plans call for a continuous belt to run behind the machines to collect scrap, carry it automatically to a baling machine near the railroad siding.

All the panels—stainless, plastic, or protected metal—are the products of the Plasteel Products Corp. of Washington, Pa. The translucent glass fiber polyester resin panels were manufactured by the Owens-Corning Fiberglas Corp. and American Cyanamid. END

Fig. 4. Special pit behind row of punch presses is designed for truck-movement of steel. Eventually a conveyor belt will be installed to take away all scrap

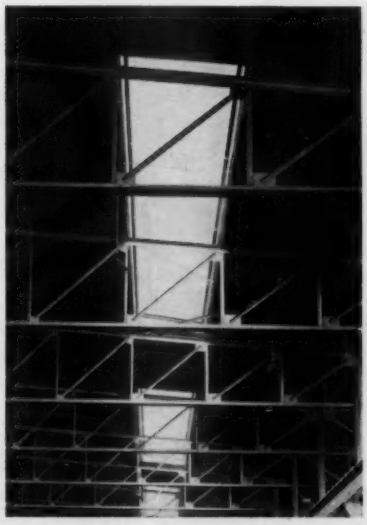


Fig. 5. Center bay has 14 plastic skylights which materially aid visibility

At this location two 4000-lb air hoists are positioning sand cores in a huge mold for a railroad freight car underframe

Air Hoists Handle Castings — Gently

Stepless Control Helps Safety and Product Quality Record

MORE THAN A hundred air-powered hoists ranging in capacity from 1000 to 10,000 lb, are used in the Commonwealth plant of General Steel Castings Corporation to permit precise control in handling sand cores and in a multitude of other demanding operations.

One of the materials handling advances made in this plant has been the placement of sand cores in the large intricate molds. Hundreds of cores are assembled like a giant jigsaw puzzle to make a single huge casting. Individual pieces may weigh anywhere from 5 to 2500 lb. Originally, these cores were handled with hand-operated hoists, a slow process of translating muscle into movement through the mechanical advantage of chain and pulley.

To achieve production speed without sacrificing control precision, the company installed air hoists in one department in 1941 to replace hand hoists. Experience with the initial units led to expanded use throughout the plant. It was found that the air hoist has unlimited speed range since control is effected by throttling the flow of compressed air. Thus, it is literally possible to lower a load in stepless degrees. This control feature has great value in positioning cores in the mold, and is equally useful in easing a core box off a completed sand core. Dozens of other load handling jobs in the foundry, core room, finishing department, and blacksmith shop are performed quickly, safely and without damage to the load by these rugged air hoists.

Air Hoist for Each Bay

In the long foundry building, every work bay in use is equipped with an air hoist. Each hoist rides a 23-ft steel beam pivoting on a vertical structural column. Some of the larger hoists have two air motors, one to lift the load, the other to move the hoist laterally along its monorail. There are three 5-ton air hoists in service: one lifting loads of heavy sand to storage, one for roll-over, and one for unloading core chills and bars in the blacksmith shop. Special long-lift air hoists are suspended from monorails attached to the roof trusses to handle parts for maintenance of the big electric traveling cranes. Some of these hoists are 60 ft up. Most of the air hoists in service are of 1,000, 2,000 or 4,000-lb capacity. They are made by Ingersoll-Rand Co.

Experience in the Commonwealth foundry has revealed other characteristics of the air hoists. If an air hoist is employed to handle a load beyond its capacity, it simply will stall and refuse to lift it. It won't drop a load. It can't burn out. The fact that an air motor can stall under overload without burning out or suffering damage of any kind is an important factor in reducing maintenance costs. It also avoids interruption of production which would otherwise be necessary while a hoist was repaired or replaced. END

Tear Sheets, Anyone?

Readers interested in obtaining tear sheets of articles should write to the Editor, PLANT ENGINEERING, 308 East James St., Barrington, Ill., or use the post-paid card elsewhere in this issue.

How To Repair Glassed Steel Equipment

Article Discusses Plug, Patch and Shield Repair Techniques

By B. G. STAPLES, Research Chemist, The Pfaudler Co.

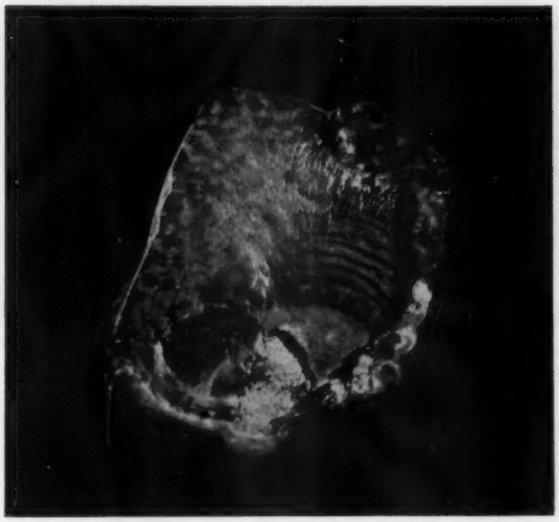


Fig. 1. This damaged section of glassed steel equipment can be easily repaired by installing a three-piece repair plug

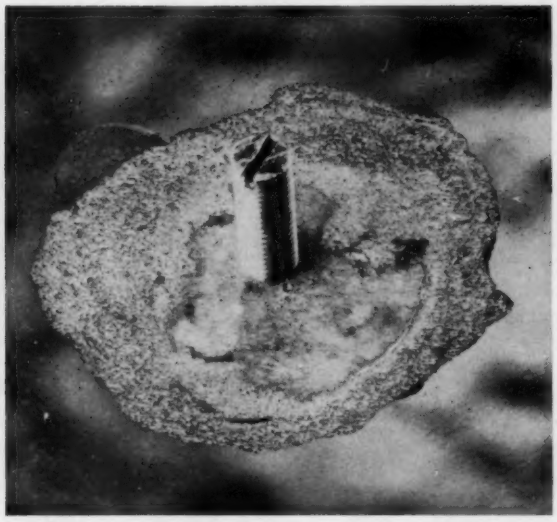


Fig. 2. To make repairs, glass around damaged area is first ground off. Then, a hole is drilled, tapped and a stud inserted

GLASSED STEEL is tough. It is so tough that it can take a great deal of abuse—physically as well as chemically. Three reasons for this surprising structural strength are: 1. powerful interlocking of glass and steel caused by the etching of the steel resulting from a chemical action which takes place between the glass and the steel during high temperature firing; 2. the coupling effect of the compressive forces building up in the glass itself as it cools after firing; and 3. the bracing of the glass by its steel backing.

A glassed steel plate, twisted 14 degrees, has been stretched beyond the elastic limit of the steel, yet the glass-to-steel bond and the glass itself remain 100 per cent in contact. Despite its remarkable strength, however, glass lined steel can be damaged. If you hit it hard enough with a hammer, you can chip it, or a nail can scratch the surface, if you use enough pressure.

However the damage that can be done by metal impact or scratching is limited because of the unique character of glass fused to steel. Because of the interlocking chemical action at fusion temperatures, fractures will not run as they do in ordinary plate glass. Consequently, sharp mechanical impact can cause damage only at the point of impact and will not ruin the entire lining or even a large area of it.

Damaged caused by mechanical impact can be, however, effectively and permanently repaired. The Pfaudler Co. of Rochester, New York, has developed several techniques for quick, effective, on-the-spot field repairs.

In order to cover the subject of glassed steel repair techniques adequately, a subdivision of these techniques into three categories is necessary. These categories are 1. plugs: 2. patches; and 3. shields.

Metal plugs are an inexpensive, durable and easily applied means of repairing serious occlusions or breaks in the glass lining of vessels. Damaged areas up to 4 in. in diameter can be satisfactorily repaired with metal fracture plugs utilizing Teflon gaskets.

Some ten years ago, gold fillings were standard on glass lined equipment and they offered considerable chemical resistance at normal temperature. However, when the chemical industry increased operating temperatures and pressures, gold plugs began to fail. This failure was due to chemical and physical inadequacy.

Because of the limited chemical capacity of gold as a material for plugs, the metal tantalum was selected as the standard plug material. Tantalum, of course, is not the complete answer to glassed steel repair problems, but it does have excellent chemical resistance and in the temperature range in which glassed steel chemical equipment is usually operated (-50 F to 350 F).

Tantalum expands and contracts at a rate very close to that of the glass. The outstanding limitation of tantalum is its lack of resistance to SO_3. Fuming sulfuric acid should be avoided. For reactions involving SO_3, plugs of a gold-platinum alloy have proven successful, and, for some situations depending upon temperature, Illium or type 316 stainless steel can be used.

Failure of tantalum by galvanic action can take place if the solution in the reactor is electrolytic, and if the

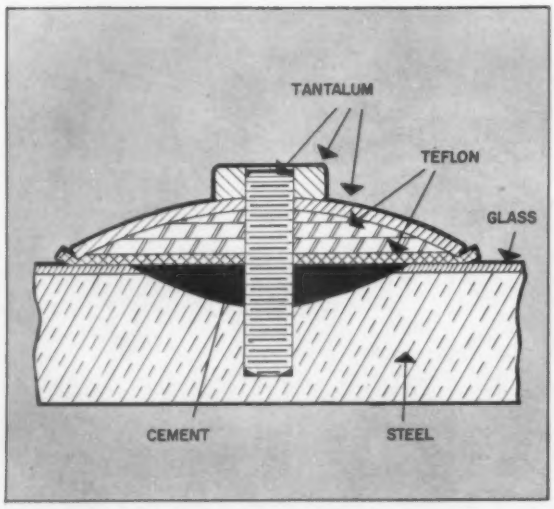


Fig. 3. Cross-section of tantalum three-piece plug-type repair

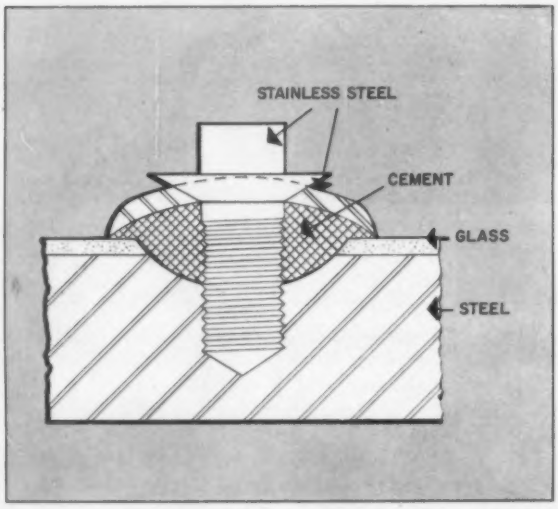


Fig. 4. Cross-section of a stainless steel two-piece plug

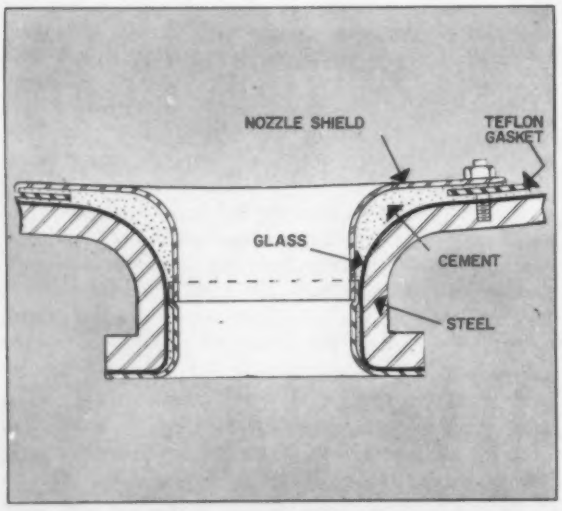


Fig. 5. Use nozzle shields in areas where you can't use plug

use of dissimilar metal in the liquid phase causes an electrolytic cell to be set up. If the tantalum is acting as the cathode, nascent hydrogen will be evolved on its surface and embrittlement will occur. If the tantalum is acting as the anode, it will corrode.

Tantalum repair failures due to galvanic action have occurred where lead, silver, stainless steel, Hastelloy or Monel were present in the liquid phase. The widest range of service is provided by tantalum plugs but less expensive metals and alloys can be used if the service permits. Hastelloy "B" and "C", types 304 and 316 stainless steel, Monel and silver are standard and stocked in various sizes. Plugs of nickle, Illium, Inconel, titanium, zirconium and gold-platinum are also available.

For damaged areas that cannot be repaired with either a plug or a seal, metal patches or ceramic patches are available.

The maximum size of a metal patch depends on the availability of the metal which will be used. For the more common metals and alloys, this is practically unlimited. Tantalum sheets, however, are only available up to 16 in. by 20 in. in 0.030 in. thickness and 12 in. by 12 in. or 8 in. by 15 in. in 0.055 in. thickness.

Welded plates of tantalum for metal patches can be obtained but they are, in most cases, prohibitively expensive. Usually even the largest repair patch is less expensive than reglassing the equipment and of course lost time is kept to a minimum by using a patch. Patches are made to fit damaged areas involved and are applied over cement and a Telflon sheet gasket.

Use of Ceramic Patches

Damaged areas of 6 in. in diameter or even larger can sometimes be quickly and effectively repaired with a ceramic patch used alone, that is, unaided by a metal plug or plate. The ceramic material is basically an air drying silicate cement. Its use is recommended only if a strong mineral acid is present at one per cent or greater concentration or if a weaker acid is present at 10 per cent or greater concentration.

A silicate cement consists of a mixture of powdered silica and liquid sodium silicate and cements of this kind have excellent adhesion to glass. These cements offer good serviceability but will dissolve in alkaline or neutral solutions or even plain water. If a glassed steel tank containing ceramic repairs is permitted to stand empty in a moist atmosphere so that water condenses on the surface of the repair and the water is allowed to remain there, the silicate cement will in time soften and deteriorate.

Ordinarily, a ceramic patch is a temporary patch while a metal patch becomes more or less permanent. The installation of a metal patch is very much like the installation of a plug. Almost always there is more than one step to be considered. This, of course, means multiple holes which have to be spaced and drilled correctly.

Usually nozzle damage cannot be repaired with a plug because of the clearance required for the agitator baffle, valve, etc., installed in the nozzle. Damage on the face of a nozzle flange obviously cannot be repaired with a plug. For these reasons standard nozzle shields of tantalum and other metals and alloys are available for permanent repairs.

Pfaudler originally started with a welded type nozzle shield for an effective nozzle repair. The welded design

can only be used as an outside shield and cannot be used on the bottom outlet nozzle in most cases. The welded shield then was only a partial answer to the nozzle repair problem.

The full answer to this problem came when Pfaudler developed a technique for forming a tantalum nozzle shield by spinning. This technique made it possible to have an outside shield which would take a glass lined valve and also an inside shield. Where damage is extensive an outside and inside shield can be used together.

When deciding what type of repair will do the job at the least expense, it should be kept in mind that an inside shield is quite expensive and should be avoided if possible. For damage to neck and top head nozzle, a welded outside shield should be used instead of a spun inside shield because a welded sleeve has a longer neck than a spun sleeve.

In discussing shields, it is important to touch on the repair to damaged agitator tips, baffles or thermometer wells which cannot be repaired with a plug unless the damaged area is very small. This is because the radius of all but the smallest plug is usually greater than the radius of the various tips. Thus the plug cannot be drawn tight. If a plug cannot be used, a cap of tantalum or some other metal is available. In addition to nozzle sleeves and caps, tantalum agitator caps, tantalum boots for thermometer wells and tantalum dip pipe ends are also available.

The three-piece plug is the most common plug design in metal repair of glassed steel equipment. A three-piece plug consists of a stud, a nut and a disc of tantalum or some other metal, Teflon gaskets and cement. The boxed item illustrates the steps to follow to properly install a three-piece plug.

If it is necessary to increase the hardening rate, the patch may be heated to a temperature not exceeding 120 F for three hours. The temperature should then be raised to 200 F and held at this temperature for four hours. The repair is then ready to be placed in use. It is important not to exceed 120 F during the initial three hours or a porous patch will result. END

Steps To Follow When Installing a Three Piece Plug

1. Thoroughly clean the exposed metal and surrounding glass coated area.
2. Grind off the glass from the center of the damaged spot to produce an exposed area slightly larger than the diameter of the tap which is to be used.
3. All loose pieces of glass should also be removed and all sharp edges ground to produce a smooth bevel.
4. Drill and tap a hole for the stud, the depth of the hole being determined by the thickness of the steel. Use a bottoming tap for this operation.
5. Clean all of the chips out of the tapped hole with alcohol and a chip blower.
6. Insert the stud temporarily, but do not pull it down tight.
7. Slide the disc under the stud, making sure that it fits snugly against the sound enamel all the way around. Any place where this disc does not fit snugly should be marked with a red crayon and the disc shaped with a small machinist hammer until a good fit is obtained. If a fitting is necessary be sure to make a reference mark on the disc and the glass so that the disc can be returned to the same position.
8. Remove the stud and clean the damaged area and the plug parts with denatured alcohol. Blow out alcohol remaining in the hole with chip blower.
9. Dip the stud bowl into cement primer, insert into the tapped hole and pull up tight with a screwdriver. Apply primer to exposed steel only, using a fine brush.
10. Allow primer to dry for approximately one hour preferably at a temperature of about 100 to 150 F.
11. Prepare furan resin cement.
12. Fill in the corroded area with the cement and extend a thin layer of cement over onto the sound glass.
13. Clean the waxy Teflon gasket with alcohol and a clean cloth, and install it by screwing it over the stud.
14. Cover the waxy gasket with a thin layer of cement. Do not apply this layer too thickly.
15. Install the leathery Teflon doughnuts by screwing them onto the studs and cover these, also, with a thin layer of cement.
16. Slip the disc over the stud and install the nut. Pull the nut up tight so that the cement squeezes out all around the edges of the repair. Be sure that you have as little cement as possible exposed around the edges of the repair after the nut is pulled up tight. If you have too much cement, remove the nut and disc and sweep off the excess cement. When the nut is pulled down tight, disc should compress the Teflon gasket all the way around the edge of the repair.
17. If stud is to be ground down flush with nut, be sure to keep the metal moist with carbon tetrachloride or a mixture of equal parts of carbon tetrachloride and cutting oil. If this is not done, the metal will absorb atmospheric gases and become brittle.
18. Apply heat slowly using steam in the jacket or electric heat lamps. During the first four hours the temperature of the patch should not exceed 120 F. Too much heat during this period of preliminary setting produces a porous patch.
19. At the end of four hours, raise the temperature to 150 to 160 F and hold at this temperature for 24 hours. The repair is then ready to be placed in service.

New d-c motors now appearing offer improved performance and other benefits to users . . . This article describes some of the aspects of the motors affecting their selection

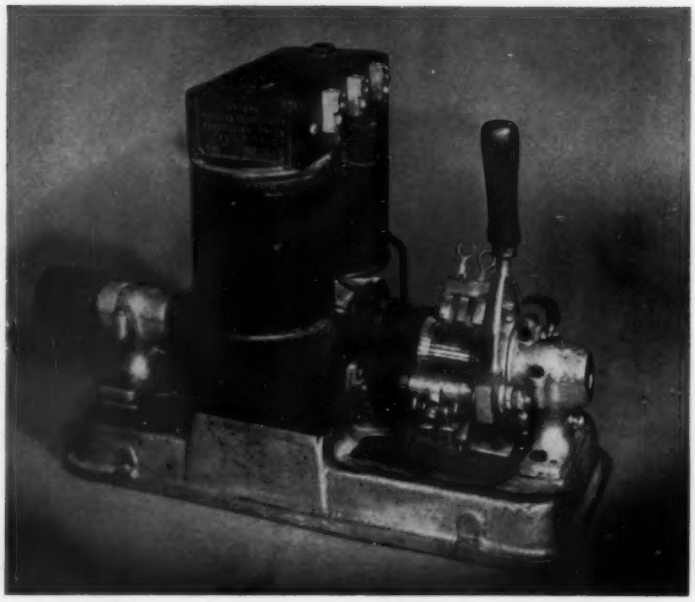


Fig. 1. Early design Edison bi-polar dynamo rated ¾ kw. Built about 1885

Look What's Happened to D-C Motors!

Acceleration Rate Up 30 Per Cent, Bulk and Weight Reduced

By J. F. DAVIS, Design Engineer, Direct Current Motor and Generator Dept., General Electric Co.

AFTER SEVERAL DECADES of emphasis on a-c motors, industries are again turning to d-c motors to solve today's difficult problems. Demands for higher production rates has placed a great burden on modern drive motors. Requirements for variable speed, rapid acceleration, higher horsepower, easy maintenance and space limitations are all easily met with modern d-c motors.

The first power station erected by Thomas A. Edison on Pearl Street in New York City generated and distributed d-c power, therefore the early motors used in industry were d-c motors. A small Edison bi-polar motor built about 1885 is shown in Fig. 1. Motors like this one pioneered many of the first applications of electric power to industrial applications.

A few industries were quick to apply d-c motors to driving the machines required for their processes, and recognizing their many advantages, have continued to use them in increasing quantities. The steel industry is perhaps the largest single user of industrial d-c motors today and one of the first industries to install them. Many cranes were equipped before 1900 with d-c motors which were duplicates or slight modifications of locomotive or streetcar motors, and thus material handling began to be motorized.

Mining engineers very early adapted the electric locomotive and the hoist, both powered by d-c motors, to the special requirements of that industry as far as moving ore, coal and personnel in and out of the mines. But most of the actual work of mining was done by manual labor until more recent times.

The invention and development of the a-c induction motor, however, slowed the pace at which industry was applying d-c motors to drive machines. The induction motor seemed to offer many advantages, especially reduced maintenance, which was a severe problem in early d-c motors. The advantages of generating and distributing power as alternating current instead of direct current became apparent, and soon there were only isolated communities supplied with direct current from a central station. In this way the electrification of many industries took place using only a-c motors.

One basic advantage which d-c motors have over a-c motors is the ability to operate over a wide speed range and to accomplish this simply and economically. Most a-c motors are inherently single-speed machines, the speed being determined by the frequency of the power supplied and the number of poles of the motor. Wound-rotor induction motors, series wound a-c motors and brush-shifting a-c motors can provide some speed variation but not to the degree possible with d-c motors. Very wide speed range is required on some applications, such as feed drives and tracer drives on machine tools, which cannot be provided by a-c motors without adding mechanical speed changers.

Most manufacturers make a variety of products, or perform a variety of operations on a product, which makes it desirable for their machines to run at different speeds. Being able to vary the speed to suit the need means increased production and higher quality, and if the driving motors can be easily and simply controlled, the operation can be made automatic. Direct current motors are among the important tools which are making possible the age of automation.

Electrical manufacturers of d-c

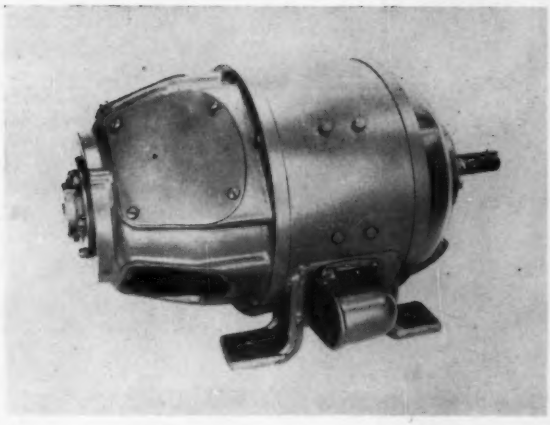


Fig. 2. Old type B direct current motor designed about 1930. Progress has made this motor obsolete by today's standards

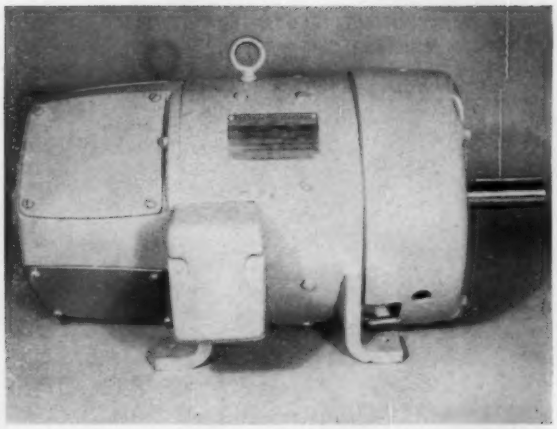


Fig. 3. Modern d-c motor has Class B insulation and small diameter armature. Drive end fan improves access to brushes

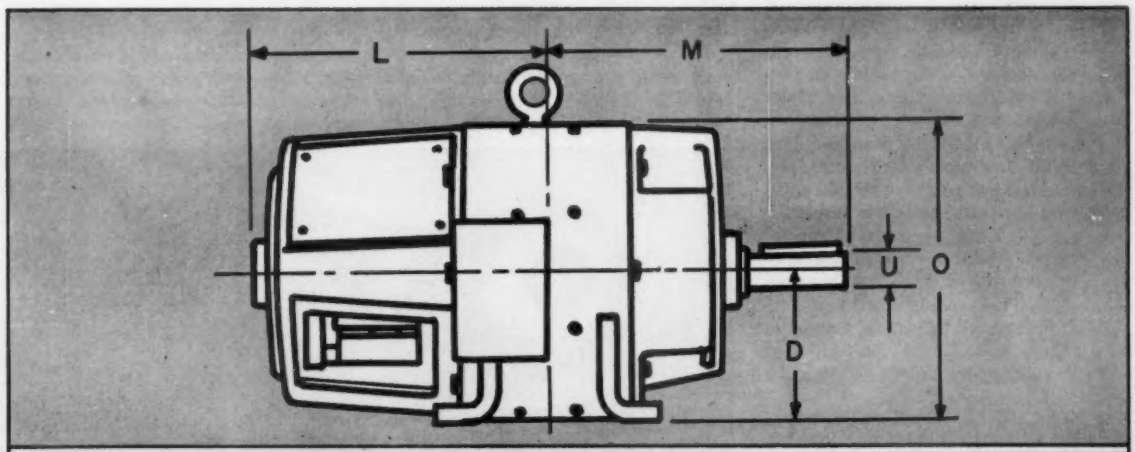
equipment have recently made, and are continuing to make, a number of improvements in their products. Recognizing these improvements and the changes in usage, the National Electrical Manufacturers Association (N.E.M.A.) has approved and published within the last year many new suggested standards for future design relating to d-c motors and generators. To take full advantage of these new standards and the advancements in the art of designing d-c machines, several manufacturers will design completely new lines of d-c motors and generators. The General Electric Co. recently developed a new line of d-c motors. Examples of some of the features of this line will be used to illustrate this article.

Some of the important improvements which will be discussed are: 1. reduced size and weight; 2. faster response; 3. greater overload capacity; 4. reduced and simplified maintenance; and 5. new power supplies.

Reduced size and, to a lesser extent, reduced weight are important to the industrial users of d-c motors. The driven machines today need more power, but frequently there is no more space available for the motor. Milling machines and other machine tools are a good illustration of this problem. The spindle drive motor mounted on the crossrail of a milling machine has definite limitations on size because of the required location of the spindle, and on weight because of the structural strength of the crossrail required to support a heavy motor.

These drives were formerly powered with intermittent rated motors from 10 hp to 50 hp. Now the builders of these machine tools are asking for

Table I. Comparison of weights and dimensions of modern d-c motors* showing the improvements made since the 1930 design



	FRAME SIZE		WEIGHT in lb		D		L		M		O		U	
HP	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW
1	203	186	95	90	5	4½	8½	9 1/16	5 11/32	6 1/16	9 3/32	8 3/32	¾	⅞
5	254	254	210	205	6¼	6¼	11 1/16	11⅜	8 1/16	8 1/16	12 1/32	12 1/32	1⅛	1⅜
10	66	284	355	325	8	7	13⅜	13¼	10 3/16	9 1/16	15 3/32	13 3/32	1⅝	1⅝
25	85	326	715	520	10½	8	16 13/32	15¾	11	11 1/16	20¾	15⅞	2⅛	1⅞
50	95	404	985	870	12	10	17	17½	12 1/16	12 1/16	23¾	19⅞	2⅜	2⅜
100	1135	445	2000	1320	14	11	20¼	20 1/16	18¾	15 1/16	26 1/16	21 1/32	2⅝	2⅝
150	1239	505	2610	1895	15	12½	22⅝	22⅞	20¾	17 1/16	28¼	24 3/32	3⅛	2⅞

*All motors rated 1750 rpm, 230 or 240 volts, shunt wound, open or dripproof enclosure, ball bearings.

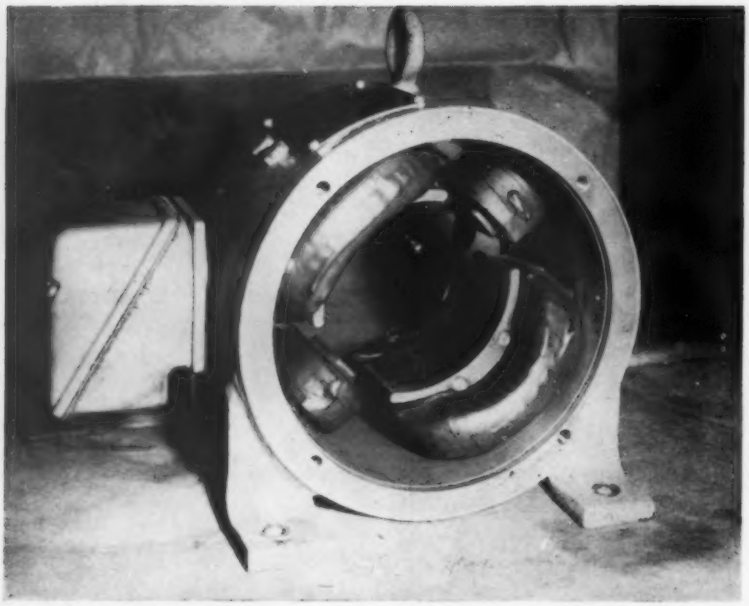


Fig. 4. Assembled stator for new d-c motor showing main and commutating poles and coils. Full complement of commutation poles increases overload capacity

motors up to 200 hp rated on the same basis to perform this function. Certain lathes use d-c motors mounted inside the base where they drive the spindle through gears. The space for mounting the motor cannot be increased, but with the advent of better cutting tools, higher speeds and greater power are needed.

Table I shows a comparison of weights and critical mounting dimensions for the new type motor and its predecessor for several typical ratings. On the average, the new motor produces about 30 per cent more power per pound than the old motor.

The new N.E.M.A. standards for industrial d-c motors and generators are written around Class B insulation. This class of insulation by definition consists of "materials or combinations of materials such as mica, glass fiber or asbestos with suitable bonding substances." The outstanding characteristic of Class B insulation compared with Class A insulation, formerly used in general purpose motors, is its greater resistance to heat.

New Temperature Ratings

Recognizing this fact, the new standards establish higher temperature rise ratings. The new dripproof motors are rated 60 C rise as compared with 50 C for dripproof and 40 C for open Class A purpose motors and the new totally-enclosed motors are rated 75 C rise as compared with 55 C.

This is one of the reasons why size and weight can be reduced. It does not mean decreased insulation life, however. On the contrary, the most popular enclosure of d-c machines is the dripproof enclosure, and according to theory the new standard value of 60 C temperature rise for this enclosure with Class B insulation should give approximately twice the life of the old 50 C, Class A insulated, dripproof motor.

Another factor which has made possible the significant reductions in size and weight of d-c machines is improved ventilation. The new type d-c motor has a large, but light weight, aluminum fan which draws air into the bottom hand hole openings at the commutator end.

The air divides into two paths. Part of the air flows over the commutator, through the air gap and between the field coils, into the fan and out the opening in the drive end bearing bracket. The other path takes air under the commutator near the shaft, then into axial ducts in the armature punchings, under the armature coil end windings, into the fan and out as before. The large volume of air moved through the machine and its careful distribution provide excellent heat transfer for cooling these machines. The improved ventilation permits higher mechanical ratings.

Lower Inertia

Many applications that use d-c motors must start, stop and reverse frequently as well as change operating speed. These transitions from one speed condition to another are usually non-productive parts of the duty cycle. It is, therefore, advantageous to complete them as quickly as possible.

In some applications, the product being processed is not of acceptable quality until the desired speed is attained, and there is the further incentive to accelerate rapidly in order to reduce the amount of scrap material. Accuracy and precision in such drives as tracer control systems of machine tools demand high rates of acceleration.

Angular acceleration is directly proportional to the applied torque and inversely proportional to the inertia of the rotating mass. By decreasing the size of a motor, it is obvious that this torque to inertia ratio is going to increase and the motor will accelerate

Fig. 5. Skewed slots in motor armature reduce torque pulsations and magnetic noise. Ventilating fan draws cooling air inside and over outside of armature

faster than a larger motor of the same rating.

Table II lists the inertia value of armatures in several sizes of the new type of motor compared with the previous line. An average reduction of 35 per cent has been achieved, which means a 35 per cent increase in acceleration rate for the same load torque or current. However, the new motors are capable of carrying greater overloads for these transient periods and the acceleration rate can therefore be made still greater. Of course, if the inertia of the connected load is large compared with that of the motor, this improvement would not be significant. But this is not generally the case in the typical d-c motor application.

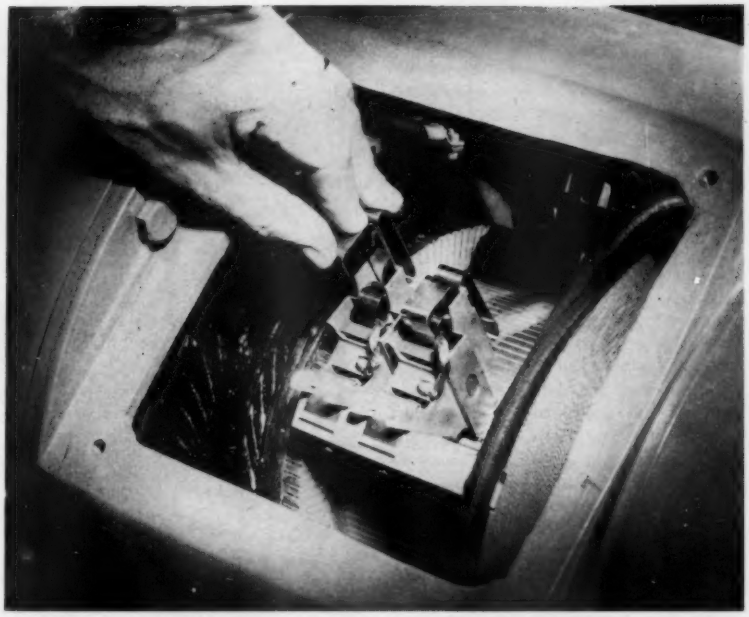


Fig. 6. Brush inspection and maintenance is simplified by design of constant pressure spring. Brushes can be replaced with one hand with spring in safe position

Fast Response

When the inertia of the connected load is converted to a basis equivalent to that of the motor by dividing it by the square of the gear of belt ratio, the motor inertia is usually an appreciable part of the total inertia. Therefore, in the majority of cases, this means snappier performance, faster starts, stops and speed changes.

Adjustable-voltage, Ward-Leonard systems effect motor speed changes by varying the excitation of the generator field. The important factor in acceleration rate then becomes the rate at which the generator voltage can be changed. The usual measure of this response is the time constant of the generator field which is the ratio of its inductance to its resistance. Again, a reduction in the size of a generator results in a shorter time constant. The time constants of modern generators are an average 30 per cent shorter than previously. Coupled with the faster response of the new motors, this generator feature means greatly improved performance for this popular speed control system.

Size of motor required to drive a machine is determined by one of two factors, whichever is limiting for the particular application. One criterion is heating of the motor as determined by the root-mean square or other equivalent value of the various loads and operating times in the duty cycle. The other factor is the maximum torque required to meet the worst condition of the duty cycle. In many applications this second criterion leads to the selection of a larger motor than required by heating calculations.

It is especially important, therefore, on these applications with high ratios of peak load to average load, that the motor be capable of carrying loads greater than its continuous rating. Direct current motors do not have an inherent characteristic which definitely limits the maximum available torque in the way that the pull-out torque of a-c induction motors does. Instead, the torque of a d-c motor continues to increase with load current until the machine actually stalls. This is not a practical operating point on most motors (except when operated on reduced voltage). The maximum permissible torque is determined either by the quality of commutation (sparking) or the mechanical strength of the shaft and bearings.

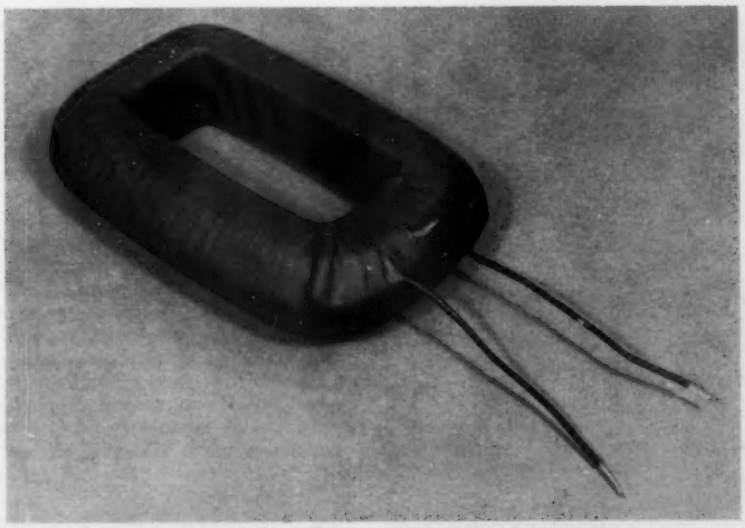


Fig. 7. Field coils are encapsulated with a polyester material which improves resistance of insulation to effects of moisture and contaminants in atmosphere

Reduced Sparking

Special emphasis was placed on obtaining good commutation during overloads in the design of the new type motors. In order to reduce the reactance voltage which tends to cause sparking, armature windings were made with the minimum number of turns per coil. The susceptibility of commutators to flash-over was minimized by designing commutators with the maximum practical number of bars so that the volts per bar would be reduced. A full complement of commutating poles (i.e., as many commu-

tating poles as main poles) is used in every machine. This allows greater overload currents before the commutating flux circuit becomes magnetically saturated. Better brushholders and improved manufacturing techniques in making commutators allow the brushes to ride more smoothly. New brush grades reduce sparking also.

Improved Commutation

The result of all these factors is that our new line of motors can commutate greater overloads than before — considerably more than the 150 per cent minimum load for one minute required by N.E.M.A. standards. The amount of allowable overload, from a commutation standpoint, varies with speed. It is the greatest at low speed, when most often needed during starting and acceleration, and lowest at top speed.

Although the overall size and weight of these new motors is smaller, the shafts and bearings are equal to those in the previous design for the same rating, and larger in many cases. Furthermore, they are considerably larger for a given frame size. Very seldom are these mechanical factors limiting in the size of motor chosen for an application. The applications for which the shaft stresses and bearing loading should be checked are those with unusual belt or gear drives or those where the motor will encounter excessive impact or vibration.

Great strides have been made in the march to reduce and simplify the maintenance required in recent years. This does not mean, however, that these d-c machines should be installed and then forgotten. They will give much better service and serious outages will be prevented by occasional inspection and simple preventive maintenance. There are three items in any d-c motor which should have periodic attention: brushes, bearings and insulation.

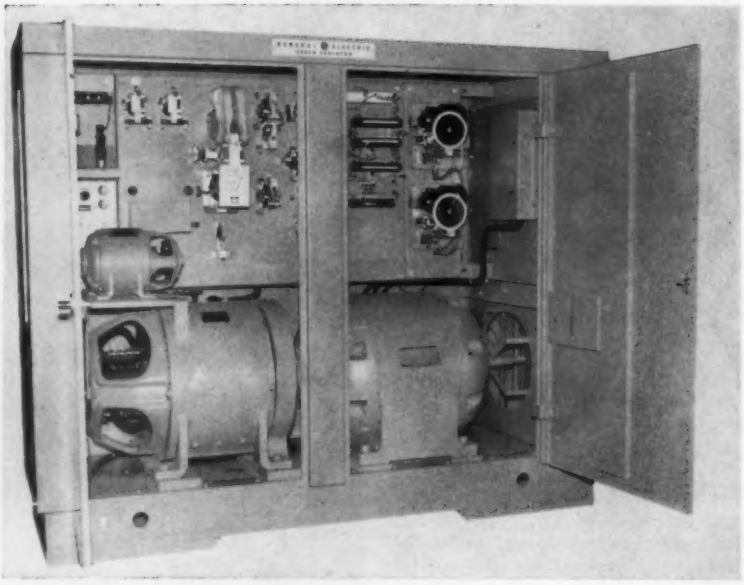


Fig. 8. Packaged generator for large d-c motor ready to set in place and connect to a-c supply. Pressure ventilation system permits operation in most locations

Better commutation, mentioned previously, and better brushes, brushholders and commutators will reduce brush wear and prolong the life of carbon brushes. Constant pressure springs have been employed in the brushholders of our new line of d-c motors to provide the same force on the brush throughout its wearing length and eliminate the need for adjusting springs as the brush wears. To simplify the inspection and replacement of brushes, the spring can be disengaged and rotated away from the brush. The spring is held captive here in a safe position above the commutator, while the brush is removed, so that there is no danger of dropping. All this can easily be done with one hand, although the larger hand hole openings in the end-shield provide greater accessibility.

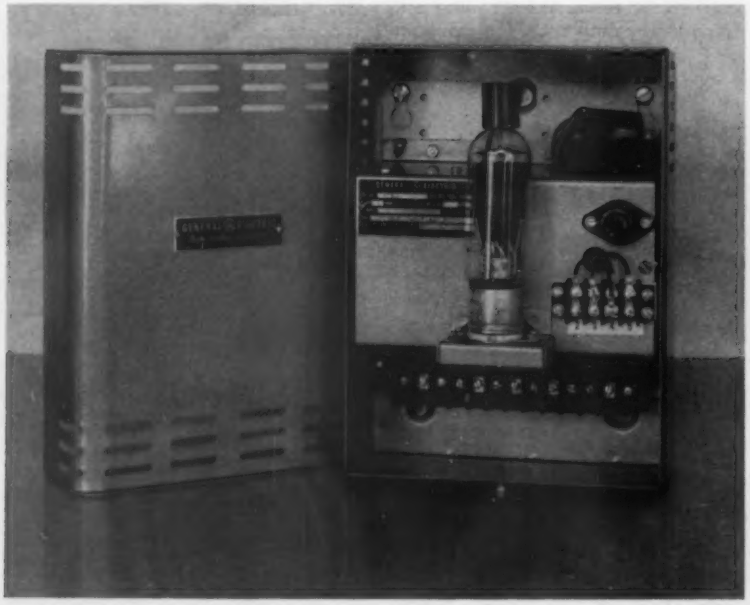


Fig. 9. Electronic rectifier power supply converts a-c power to d-c. Unit supplies both armature and field voltages and is used for low horsepower applications

New Greases

New improved greases permit longer and higher temperature operation of bearings without relubrication. The trend of most manufacturers of d-c motors from 1 to 200 hp is to use mostly ball bearings. The ball bearings in the new type motors will run as long as any motor bearing system without lubrication. However, for tough applications, the life of the bearings can be greatly extended by occasionally replacing the old grease with new grease, and so lubrication fittings are provided for this purpose. No disassembly of the motor is required to relubricate the bearings.

Insulation life is adversely affected by high temperatures, moisture, contaminants and excessive vibration. Class B insulation systems give excellent life under these conditions as compared with other systems. Short

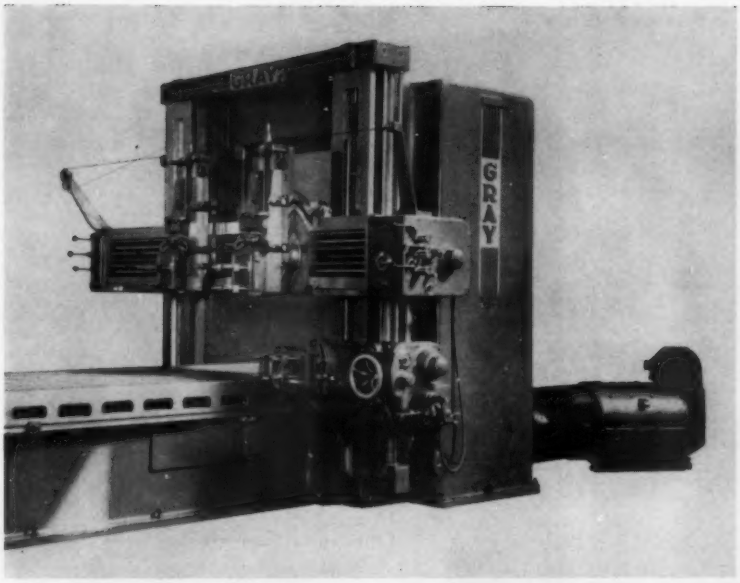


Fig. 10. This high speed planer uses a d-c drive motor because starting and stopping on each stroke requires a motor with low inertia and high accelerating torque

periods of high temperature operation can usually be withstood without damage, but prolonged operation at temperatures appreciably above rated will result in decreased life, so severe overloading should be avoided. Failures due to this factor alone, however, do not seem to be common in the recent history of d-c motors.

Careful mounting and lineup during installation will reduce vibration. The coil surfaces should be wiped periodically to remove dirt. All main and commutating field coils in our new d-c motors are encapsulated with a polyester material which is very effective in keeping moisture and contaminants out of reach of the conductors where they could cause failure.

Power Supplies

As mentioned in the beginning of this article, most of the electric power generated today is a-c. In order to use d-c motors, some means of converting a-c to d-c is required. Formerly it was the practice to use large motor-generator sets or rotary convertors for this purpose. These machines supplied a constant voltage to a bus which ran throughout the plant. The d-c motors used on a fixed voltage bus must have large resistors inserted in series with the armature during starting (except for very small motors).

Once started, the speed of these motors can be adjusted upward from its base value by adding resistance in series with the shunt field, but it cannot be lowered below the base speed. This system has a number of disadvantages. It is not efficient; voltage regulation at the end of the bus is usually poor, resulting in erratic operation of motors; the available motor speed range is quite limited.

Although not new, the adjustable-voltage, or Ward-Leonard, d-c system has recently become a popular type of power supply for d-c motors. In this system a motor-generator set of appropriate size supplies power to a single d-c motor, or a small group of motors which must operate together. The shunt fields of both the d-c motor and the d-c generator are separately excited.

By varying a rheostat connected to the generator field, the output voltage of the generator and the speed of the motor can be easily controlled from zero to a maximum value in both directions. The speed range of such motors can be essentially infinite. High speeds can still be obtained by field control of the motor if desired. Starting resistors and their losses are eliminated. This system is especially attractive where the drive must accelerate, decelerate, or reverse frequently.

Since adjustable-voltage systems for single motors constitute the largest demand for d-c generators today, the new N.E.M.A. standards have standard kilowatt ratings for d-c generators. These in turn match the power needs of standard d-c motors and the driving power available from standard a-c motors used in motor-generator sets. The better matching of these popular power supplies results in savings in space, weight and cost for a d-c drive system.

The popularity of the adjustable-voltage system had led several manufacturers of d-c equipment to offer packaged power supplies. These consist of a motor-generator set with exciter and all necessary control equipment mounted in a single cabinet. These power supplies offer several advantages to industries which need d-c drives. They are easy to purchase and install. Components are matched for optimum performance at lowest cost. They can be located where needed, near the motor. The cabinet provides ventilation and protection from harmful contaminants for all devices.

Rectifiers

Rectifiers of different kinds have recently become an important device for converting a-c to d-c to power motors. Grid-controlled, gas-filled electronic tubes (such as Thyratrons) are used for low horsepower drives. Mercury arc rectifiers are used for larger motors.

Dry disk-type rectifiers have not yet been used for this purpose to any great extent, but offer interesting possibilities for the future. Rectifiers are very efficient. Maintenance is simple and cost is low since there are no moving parts. However, any motor used on rectifier power supplies must be carefully chosen in order to assure that they will operate properly on the pulsating current output which tends to impair commutation and increase motor heating, especially on single phase rectifiers and at low voltage.

New d-c machines have much to offer to innumerable applications which can profitably use variable speed drives. Some of the ways in which these improvements can be used advantageously have been suggested. The new N.E.M.A. standards and improved application techniques of motor manufacturers have simplified the application problem compared to the experience in the past. However, because of the wide range of products and the many different ways in which d-c machines can be used, it is suggested that a new d-c motor application be discussed with a representative of a motor manufacturer. END

Table II. Comparison of armature inertias for both new and old d-c motors*

HORSE POWER	INERTIA IN POUND-FEET²	
	OLD	NEW
1	.20	.158
5	1.26	1.02
10	3.62	2.08
25	12.8	5.5
50	20.1	15.6
100	46.1	28
150	75.9	52

*All motors rated 1750, 230 or 240 volts, shunt wound, open or dripproof enclosure.

Fig. 1. Expander strap is anchored to vertical rod support. Block joints, right, were pointed with insulating cement

Fig. 2. Galvanized sheet metal is applied over insulation as "raincoat." Specially slotted holes allow metal expansion

Want To Reduce Costs on Heating Bulk Storage Tanks?

Try Insulation Plus "Raincoat"

DESPITE THE RELATIVELY low temperatures involved, the need for insulating storage tanks for fuel oil and other heated liquids is dictated by practical economics. For instance, No. 6 fuel oil, commonly used in industry, must be stored at or above 120 F.

This is not a high temperature by most industrial standards, but the large outer surface area of a storage tank, the comparatively high rate of heat loss due to its outdoor location and the increasing cost of heat have made the insulation of heated bulk storage units mandatory in the petroleum industry.

Permanent tank insulation becomes more important economically when storing liquids that are even more viscous than No. 6 and thus require higher storage temperatures.

Full and continued realization of the savings to be gained by insulating tanks which store viscous fluids will, of course, depend upon the efficiency of the thermal barrier itself. Primary considerations here, according to Kenneth M. Ritchie, Manager, Technical Service of the Baldwin Hill Co., Trenton, N. J., are the selection of the insulating material, the structural stability of the heat barrier, and the integrity of the weather seal which protects the insulation.

Spun mineral wool insulating materials are among those often specified for insulating heated storage tanks.

Use of mineral wool blocks, which have a high degree of structural strength, eliminates the need for complex attachment methods and the blocks support each other.

Flexibility is relatively unimportant because the blocks have enough resiliency to conform to large radius curved surfaces. They resist fracture and abrasion in handling, and may be cut to required odd shapes with a knife or hand saw.

The method of securing the insulation is important from the standpoint of maximum thermal efficiency and installation permanence. The primary erection consideration is the establishment of a tight thermal seal having structural stability and provision for thermal expansion of the tank. One method used in insulating storage tanks is a direct and effective technique which meets requirements and is relatively simple.

Blocks, 36 in. by 18 in. in this case, are laid with their long dimension parallel to the vertical axis of the tank. Adjacent blocks are staggered and all are held against the surface of the tank with steel expander strap (Figure 1). The joints between the blocks are pointed with quick-setting mineral wool insulating-finishing cement.

Subsequent thermal expansion of this tank was compensated for by attaching the insulating wall in separate, independent sections. None of these individual sections, which are separated by the horizontal and vertical members which support the insulation, need accommodate more than one inch of expansion in either direction.

Steel angles which are welded to the shell, encircle the tank and serve as

shelves to support the blocks above them. The angles are spaced so that, between adjacent shelves, the total longitudinal expansion of the tank will be less than one inch.

Vertical rods, which have been welded at intervals around the vessel circumference, support the insulation horizontally. Welding studs space the rods away from the tank surface. The rods anchor the expander strap which is stretched between them (Figure 1). They also are spaced so that there will be less than one inch of circumferential expansion between adjacent vertical support rods.

Thus, no part of the insulation coat must sustain the tank's total thermal expansion in either direction. The blocks covering each section of tank surface, between adjacent angles and rods, are independent of the blocks in other sections. If the blocks have been tightly applied, they will adjust easily to this limited increase in surface area, and so will the expander strap.

Use of sheet metal sheathing is a popular method of weatherproofing insulation on cylindrical vessels. Either galvanized sheet steel or sheet aluminum may be used. The photographs show the details of erecting such a weather barrier. This metal jacket is impervious to moisture, yet it has been designed to breath—to expand with the thermal growth of the tank.

As shown in the photographs, the sheets are applied with the long dimension horizontal. They are supported by each other and by the horizontal angle shelves which also support the insulation. Vertical joints are flat-lock seams and the locked sheets are joined with sheet metal screws. The screws penetrate the plain edge of the "locked-in" sheet through pre-punched holes which are slotted horizontally to allow the sheet to slip along the circumferential expansion of the vessel.

Horizontal seams between adjacent rings of metal sheets are lapped, with the overlapping upper sheet supported from below by an S clip hung on the top edge of the lower sheet.

Sheet metal screws join the overlapping sheets. Here the pre-punched screw holes in the overlapped lower sheet are slotted vertically to allow for longitudinal expansion of the tank.

Care must be taken in the selection of screws, washers, clips, and other metal materials so that no galvanic corrosion will occur between adjacent parts.

Insulation was secured to the roofs of the tanks by impaling mineral wool blocks over upright studs welded to the roof and securing them with speed clips. This same method of attachment was used on the sidewalls wherever projections prevented the use of steel strap, such as beside the stairways.

Aluminum sheets or aluminum roofing secured by sheet metal screws or welding studs may be used for weatherproofing tank roofs. However, the tank roofs shown were weatherproofed by the application of two courses of 15-lb roofing felt followed by a final layer of 55-lb roofing felt. The type of weatherproofing used on the roof depends on the foot traffic it is expected to bear in service.

Whatever method of weatherproofing is used on the roof, a sheet metal flashing should be installed at the junction of sidewalls and roof to insure that water cannot run behind the sidewall sheathing to penetrate the thermal insulation behind it. Flashing must also be used to prevent the intrusion of water at any break in the metal jacket required by a projection from the tank surface. END

This Way To Figuring Savings in Heating Costs

Savings in heating costs which can be expected by the insulation of even low-temperature heated tanks and vessels located outdoors is illustrated by this example. Heat loss from outdoor equipment is normally much greater than from indoor units which are surrounded by warmer, still air. Convection losses are much higher outdoors.

In the problem, the tank, which stores fuel oil at 140 F, is 120 ft diam, 48 ft high. Its surface emissivity factor is assumed to be 0.90. Ambient conditions assumed in the problem, are based on mean temperatures and wind velocity for various U. S. cities.

Calculations were based upon the following equations:

(1) $U_r = 0.172 \times 10^{-8} \times e(T_s^4 - T_a^4)$

(2) $U_c = (t_s - t_a)(1 + 0.225\ v)$

(3) $$U = \frac{t_h - t_a}{\frac{x}{k} + \frac{t_s - t_a}{U_r + U_c}}$$

(4) $$t_s = t_h - \left(\frac{x}{k}\right) U$$

where:

k = thermal conductivity of block insulation at its mean temperature, Btu/hr/sq ft/°F/in.

t_a = ambient air temperature

t_h = hot surface temperature

t_s = outside surface temperature

T_a = ambient air temperature, absolute

T_s = outside surface temperature, absolute

$U = U_r + U_c$ = overall heat transmission or surface heat loss, Btu/sq ft/hr

U_c = surface convection loss, Btu/sq ft/hr

U_r = surface radiation loss, Btu/sq ft/hr

x = thickness of block insulation, inches

v = wind velocity, ft/sec

e = emissivity

The calculated heat loss figures should be conservative, since no distinction has been made between radiant loss from the tank roof and its sides.

Cost Comparison of Heating Bare and Insulated Fuel Oil Storage Tank

Assumptions			
Diameter	120 ft	Mean ambient air temperature	50 F
Height	48 ft	Mean wind speed	10 mph
Surface area	29,405 sq ft	Cost of heat per million Btu	$0.60
Hot surface temperature	140 ft	Thermal conductivity of insulation	*0.33

Type of insulation	None	Mineral wool
Thickness of insulation	0	2 in.
Heat loss, Btu/hr, sq ft	483	15.40
Annual heating cost @ $0.60 per 1,000,000 Btu (8,760 hr/yr)	$74,635	$2,380
Annual savings in heating cost due to insulation[1]		$72,225

*Mineral wool block at 100 F. mean temperature.

[1]This does not take into account the cost of insulation, which may be amortized over a number of years.

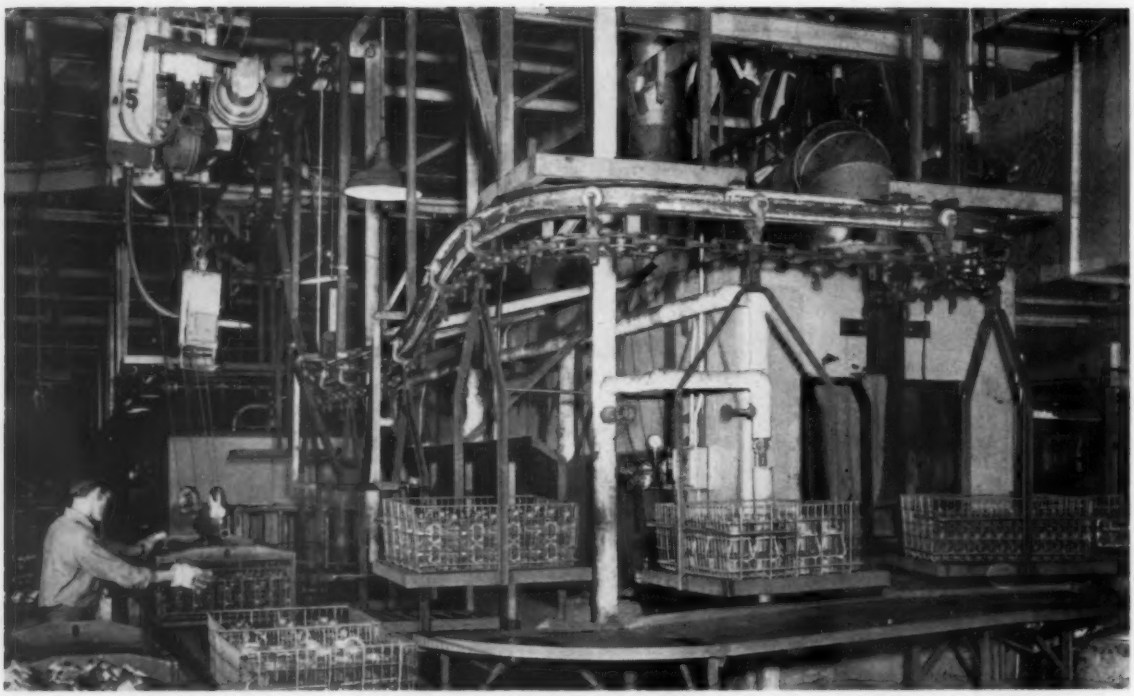


Fig. 1. View of one of the two washer stations where conveyor picks up parts to be coated. Baskets, leaving washer unit at right, are transferred to hanger by workman. Hanger is then lifted by the power unit and transported to coating room

How Small-Parts Conveying Cut Costs

Automatic Handling Improved Wash-Rinse-Coat Operations

AN AUTOMATIC CONVEYOR line that not only transports work in process, but also carries it through a series of chemical treating operations, is cutting labor costs appreciably at Johnson Motors, Waukegan, Illinois.

Previously, castings were manually trucked over from the washing station, then dunked into the treatment bath by hand. A different process was used then, involving two stages instead of the present four. Under the old setup, up to 10 people were required to move castings from the washers through treating and on to further machining or storage.

Now the complement totals five—three at the washing units, two to handle the unloading chore. And current production is approximately double what it was when the former system was in use.

The new conveyor system handles a wide variety of aluminum castings used in the Johnson outboard motors. It picks up basketloads of these castings at a washing station where shop grease and grime are removed, then carries them approximately 120 ft to a four-stage phosphate-coating bath. The phosphate treatment oxidizes the surface of the casting and makes it more resistant to salt water corrosion.

After the basket has been dunked in each of the four tanks, it is conveyed to one of two nearby unloading stations. From the time the castings are loaded at the washing station, until after they are unloaded after the chemical treatment no human control is required.

Heart of System: Lift Unit

Castings are transported to the coating room, lowered into and raised out of each tank, then taken to the unloading points automatically.

Heart of this conveyor system is a Louden Electrolift power unit. Six of these lift units are installed on a monorail beam, mounted approximately 20 ft above the shop floor. Each has two ½-hp motors—one to control forward movement of the loaded baskets, the other to raise and lower them.

At each point where the power unit has to be stopped and castings dunked into a tank, there is a mechanical switch hooked up to a system of relays and timers which provides the necessary control. The switch, actuated by the power unit, triggers the relays that start and/or stop the appropriate motors.

The timers, connected to some of these relays, control the time that the castings spend in each tank. Although one of the four stages comprising the treatment is rather critical—castings must remain in this bath at least 30 seconds, but must come out in no more than 45 seconds—the timers are able to handle their chore quite efficiently.

Attached to each lift unit is a control panel, which permits all, or part, of the operation to be managed manually. In practice, the lowering and raising of baskets at the beginning and

end of the conveyor line is done by pushing a button instead of automatically. The movement of the lift units back to the washing machine along the closed loop formed by the monorail beam is also panel-controlled. There are actually two washing machines, and hence two points where the power units can be sent for new loads.

The conveyor handles between 150 and 200 types of castings in two types of baskets. The larger basket measures 27 in. wide by 52 in. long by 27 in. deep. Grappling hooks attached to the pulley on each lift unit are run through reinforced eyes on the sides of the basket. These containers transport all the parts to be treated except cylinder chambers.

Smaller Basket Parts-Handling

Cylinders are carried in smaller baskets that have individual chambers for each unit. Depending upon the size of the cylinder, 6 to 18 of them can be carried in a basket. When a basket is full, it is placed on a special hanger prior to being conveyed to the treating room. The hanger holds four baskets of cylinders, and attaches to the lift unit via the same system of grappling hooks and eyes described above.

Each power unit can carry up to 500 lb of castings at a time. The average load ranges from 125 to 150 lb. The conveyor takes about 20 baskets of castings through the tanks per hour.

Here is a step-by-step description of what happens:

Cylinder chambers and crankcases are processed in one of two washing machines that feed the automatic conveyor. These parts, previously drilled and tapped in an adjoining machining area, are transported by monorail conveyor to the washer. Here, they are washed with a neutral soap solution, then given a clear rinse. The operation takes approximately three minutes per basket.

Baskets carrying cylinders and crankcases are conveyed through the washer on the same conveyor that brought them from the machining department. Afterward, the baskets containing crankcases are removed (these parts have been corrosion-treated already), and sent to assembly or storage, while those baskets containing cylinder chambers are loaded onto the conveyor to receive the corrosion treatment.

Small parts are trucked from various machining departments to the second of the two washing machines. This is a smaller unit which processes castings in about two minutes and 45 seconds. As each casting comes out of the washer, it is manually transferred from the belt conveyor that runs through the unit to one of the large baskets mentioned earlier. Then, when the basket is full, it is hooked up to a lift unit and carried into the treating room.

The four baths comprising the process contain: 1. a hot water (120 to 140 F) rinse; 2. phosphate solution; 3. a cold water rinse; 4. a weak chromic acid solution. This latter bath adds to the quality of the job by sealing the treated surface of the casting.

Tank Features

Each tank contains approximately 270 gal of liquid. Water is added to the hot rinse tank at the rate of approximately 12 gpm and to the cold rinse tank at the rate of about two gallons per minute, to prevent buildup of impurities that may be deposited by the castings as they go through. Drain off is through an overflow pipe that leads to a sewer line. The chromic acid and phosphate solutions are checked frequently for strength and changed manually as needed.

After being treated, the castings are conveyed to one of two unloading points, both of which are just outside the treating room. Cylinder chambers go to one location where, after being unhooked from the lift unit, they are placed on wheeled dollies and transferred to a roller conveyor that carries them through additional machining operations. Small castings, meanwhile, are unloaded nearby. They are wheeled to an air hose station where all chips are removed from bores and surfaces. Then the castings are trucked into storage, for use as needed by the assembly department.

Fig. 2. In treating room, conveyor automatically dips basket into each of four baths. Basket, foreground, waits its turn

Fig. 3. After being treated, the parts are then unloaded from conveyor for transfer to storage or further processing

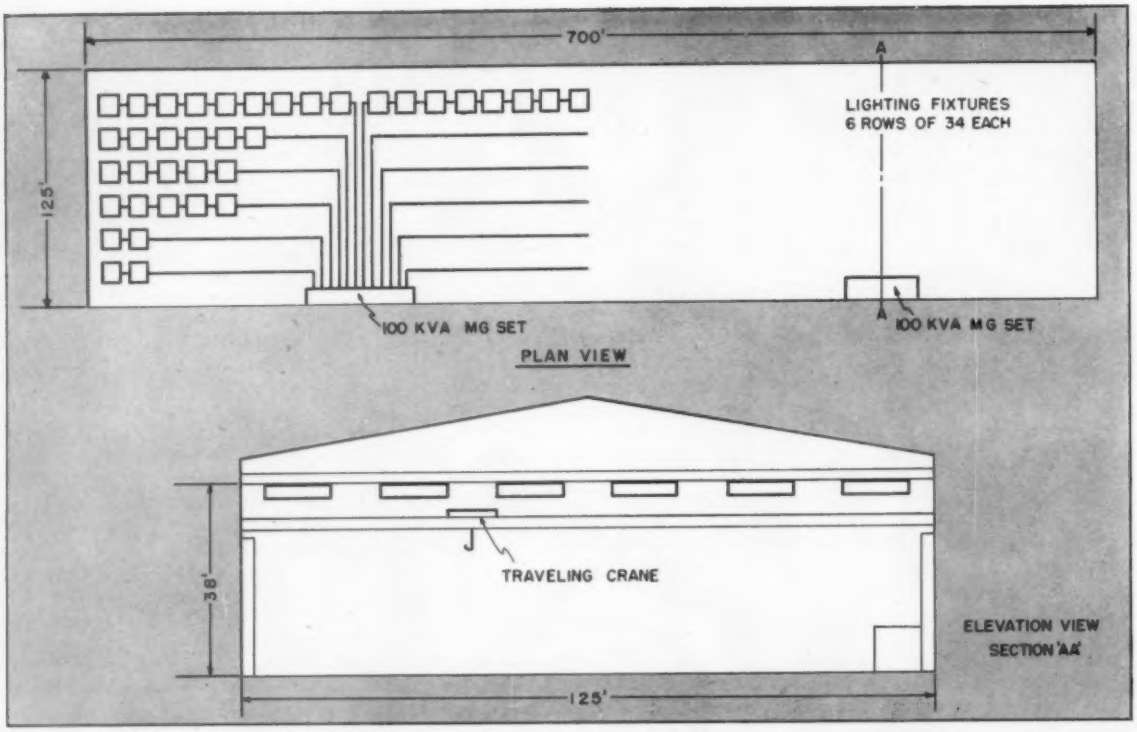


Fig. 1. High bay industrial building used for comparative cost analysis between 60-cycle and 400-cycle lighting systems

What's New in 400 Cycle Lighting?

High Frequency System Proves Lowest Cost

High frequency lighting continues to make advances . . . The growing number of installations are based on sound economics and have proven in actual field tests the advantages of this relatively new lighting tool . . . Industrial applications are expected to increase as plant engineers search for new ways to get the most out of their lighting dollar

By W. A. WEIBEL, Illuminating Engineer, Curtis Lighting, Inc., Chicago, Ill.

PUBLISHED INFORMATION on costs of high frequency lighting systems and their operation is not extensive but is very encouraging. Recent studies indicate that high frequency systems can be justified in such dissimilar interiors as large area, high bay industrial plants and commercial office areas of 10,000 sq ft lighted with recessed equipment.

High frequency power is generally supplied by rotary converters for large lighting installations. These machines have the advantage of being well known through the years of application in other than the high frequency field. They are rugged, dependable and their operation and maintenance are well understood. It is relatively simple to design a rotary converter for standard input voltages and with the output of the necessary voltage and frequency for this new application. They are available from several well known manufacturers in sizes 15, 30, 50 and 100 kw, 400 cycles.

Efficiency of rotary converters leaves something to be desired, and the problem of noise is present, but the cost is still attractive in comparison with other devices now available for frequency conversion. The problems of noise and heat losses are usually solved by housing the units in a location other than the area being lighted.

Research on the problem of fre-

quency conversion has resulted in the development of a static type of converter known as a magnetic frequency multiplier. This converter has no moving parts and is similar to a transformer in installation and operation. At present, it suffers from the major handicap of costing about four times that of a rotary converter of equal electrical size.

Maximum size per unit now available is five kilowatts. Banks of such units can be utilized for larger demands, but cost usually limits this device to special applications. It is expected that continuing development will result in economies which will reduce cost and make this device more widespread in application.

An interesting and very worthwhile feature of the magnetic frequency multiplier is that its output, when the load is largely capacitive, is essentially a square wave. The efficiency of the fluorescent lamp is much improved when operating on such wave shape.

Distribution of high frequency power at the required voltage has been no particular problem once the National Electric Code requirement for maximum voltage to ground has been recognized and satisfied. At least two of the large installations now in use utilize 96-in. lamps and the 600 v required is distributed from the generators by individual, single phase circuits.

The generators, Figs. 3 and 4, have midpoint leads on each of the three phases and these are grounded. The maximum voltage from line lead to ground does not exceed the 300 v specified by the National Electric Code. Depending on size and length of circuit, some derating of wiring and switchgear may be found necessary. In most applications, such derating should offer no problem as regards selection of materials or cost.

Fig. 2. Eight standard fixtures combine to form a single lighting unit. Operating more efficiently on high frequency, the unit uses 16 eight-ft, 87-w slimline lamps

Lamp efficiency and power factor improve with increase in frequency. The increase in lamp efficiency is the result of decrease in the electrode losses and improved wave shape of lamp current and voltage. Lamps operated at high frequencies can be loaded to greater wattage without sacrifice in lamp life. Output at 60 cycles is 5050 lumens for the 96-in. T-12 slimline lamp. At 400 cycles the light output for this lamp is 6000 lumens. It is anticipated that lamp life on 400-cycle operation will at least equal, (and may exceed) that on 60 cycles.

Although fluorescent lamps of any size and type could be operated on high frequency, the single pin slimline instant-start type is a natural choice because of its simplified circuit. The 48-in. T-12 slimline requires a voltage of 400 v and the 96-in. T-12 slimline requires 600 v. No starters or starter sockets are required and standard lampholders are very satisfactory. In fact, the inherent ruggedness of the single pin lamp and the lampholders is another good reason for the choice of slimline lamps for high frequency applications. In this respect, they are far superior to the medium bipin lamps and lampholders.

Luminaires for high frequency lighting have ranged from those of very special design to those which were merely standard luminaires for 96-in. slimline lamps converted by replacing the 118-v or 277-v, 60-cycle, tulamp ballast with the tulamp ballast for 600 v, 400 cycle. The smaller, lighter ballasts for high frequency operation have fostered the design of large area, multilamp luminaires.

Extensive use of aluminum for both

Table I. Relative annual costs, in per cent, for slimline and high output rapid start lamps operating on 60 and 400 cycles

Lighting System	IA 2-96T12 Slimline 425 ma 60 cycle 277 v	IIA 2-96T12 Slimline 600 ma 400 cycle 600 v	IIIA 10-96T12 Slimline 600 ma 400 cycle 600 v	IB 2-96T12/HO Rapid-start 800 ma 60 cycle 277 v	IIB 2-96T12/HO Rapid-start 1000 ma 400 cycle 600 v	IIIB 8-96T12/HO Rapid-start 1000 ma 400 cycle 600 v
1. Relative Initial Costs	100	84	70	89	81	66
2. Relative* Annual Operating Costs	100	99	98	90	93	93
3. Relative Total Annual Costs	100	91	83	90	87	79

*Based on 200 kw load, 4000 burning hrs per year, 1¢/kw hr energy rate

reflecting surfaces and structural members is the result of the designer striving to develop a luminaire which would be easy to manufacture, ship, install, maintain and operate. It is expected that, as demand grows, more refinement in design will be accomplished with great benefit to the ultimate user.

Luminaires of both the special and the converted standard types have been subjects of investigation and report by Underwriters' Laboratories, Inc., Chicago, Illinois. The investigation included tests for maximum temperatures of ballasts, dielectric strength of all electrical components, insulation resistance of wiring and tests to determine heating effect of changes in frequency.

Conclusions indicated that the luminaire design and construction, fire hazard and shock hazard were acceptable. Luminaire designs, as covered by the report, comply with the Standard for Electric Lighting Fixtures of Underwriters' Laboratories, Inc., Seventh Edition, March, 1955, and were judged suitable for installation in accordance with the National Electrical Code.

Ballasting for high frequency operation of fluorescent lamps may be accomplished by means of resistance, capacitive reactance, inductive reactance or combinations of these. When frequencies in the range of 300 to 600 cycles per second are reached, ballasting by capacitive reactance and inductive reactance is far superior to resistance ballasting when overall efficiency of the circuit is considered.

New Ballast

Early installations utilized an individual capacitor for each lamp or individual capacitors and choke coils on alternate lamps. More recent installations are utilizing a standard tulamp ballast, Fig. 5, complete with three leads, circuit diagram and mounting holes, features made familiar by 60-cycle ballasts. The savings in weight made possible by high frequency are apparent when the weight of the 60-cycle tulamp (9.5 lbs) is compared with the weight of the 400-cycle tulamp (3.5 lbs).

When planning a large installation of high frequency lighting, the value of power factor correction at the lamps should be recognized and properly evaluated. The use of the commercially available tulamp ballast is a convenient, economical and practical means of obtaining near unity power factor. The line current per lamp is small and with proper system design, the savings in copper can be considerable.

The tulamp ballast with line current of 0.34 amp, (0.17 amp per lamp), supplies lamp current of 0.6 amp to each lamp. No, this is not a slip of the slide rule but instead is a good example of the value of high power factor. If such correction is not made at the lamp, the relatively higher lamp current will require larger conductors to the point of correction.

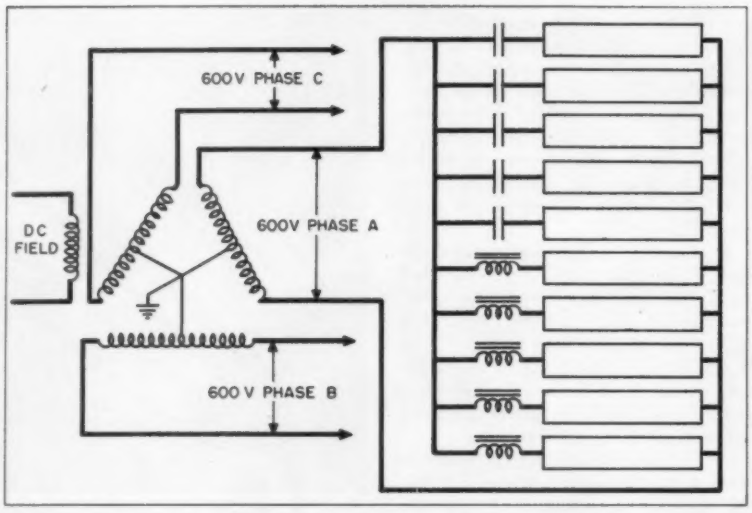


Fig. 3. Split phase power factor correction. Alternate lamps have inductive reactor and capacitor ballasts. Note three single phase 600-v outputs on generator

A comparative cost analysis* for lighting a plant 125 ft wide and 700 ft long, Fig. 1, includes a comparison of initial costs, annual operating cost and total annual cost. The per cent improvement of 400-cycle lighting over 60-cycle lighting is shown in Table I.

All comparisons are related to system IA which is the base system. It was also assumed that equal lighting levels would be provided by each system.

The 60-cycle systems are indicated in columns IA and IB. In all cases 277-v distribution was chosen as it is the most economic choice for present day 60-cycle lighting.

In columns IIA and IIB, 400-cycle lighting systems are compared which utilize the same lighting equipment as the 60-cycle lighting. The only difference being in the relative cost of the ballast and the fewer number of luminaires needed for equal light output.

Columns IIIA and IIIB indicate the cost savings which are possible when multiple lamp fixtures specifically designed for high frequency systems are utilized. These have already been designed and used for 400-cycle slimline lamp operation and similar units can be expected for the higher current lamps.

The data in all cases indicates that 400-cycle lighting results in substantial savings in initial costs, nearly the same for operating costs and savings in total annual cost of 10 to 15 per cent compared to the same lamp operated at 60 cycles.

Installations of high frequency fluorescent lamps in large, high bay areas, offer maintenance advantages. One advantage being the trend to large area, multilamp luminaires, Fig. 2. The maintenance of a smaller quantity of large area luminaires should, in most cases, be easier and less expensive than to maintain the same number of lamps in a larger number of small area luminaires.

Another advantage of a high frequency fluorescent lamp installation is that lamp life is equal to or greater than that for the same lamp on 60 cycles and greater than that for incandescent or mercury vapor lamps. Longer lamp life reduces maintenance costs by reducing the number of trips to the luminaire for relamping. If the area is such that each luminaire can be mounted high and each contains many lamps, then an outage of several lamps per luminaire is not objectionable either as regards average illumination at working level or distribution of that illumination.

Contrast this with an installation of high lumen rating mercury vapor or incandescent lamps where an outage of a lamp would adversely affect both average illumination at the work level and illumination distribution. In most cases, the mercury-vapor or incandescent luminaire would require prompt relamping whereas the replacement of several lamps in the large area, multilamp high frequency luminaires could be deferred to a more convenient time, even to the time of the next scheduled cleaning of the luminaires.

*These data and analysis as given in the AIEE conference paper "Development and Application of High Frequency Lighting" by J. H. Campbell and Q. D. Dobras.

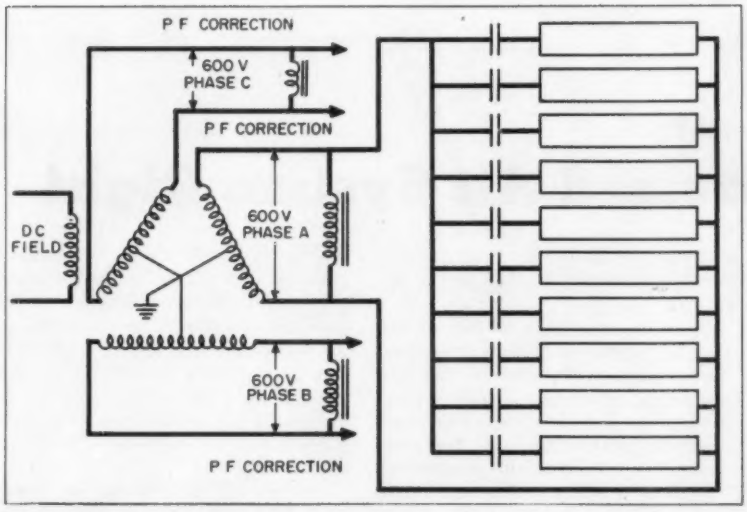


Fig. 4. Generator connection showing lumped inductance in each branch circuit combining with the capacitor ballasts in the fixtures to produce unity power factor

Applications of high frequency high bay lighting have been in operation for several years. It might be of interest to briefly review some of these installations to see how readily high frequency lighting can be applied to industrial plant lighting problems.

In 1951, a high frequency system was placed in operation in the Plant Growth Laboratories of the United States Department of Agriculture at Beltsville, Maryland. A very high level of illumination, well over 2,000 ft-c, is provided for research in plant growth. The 360-cycle power for the 96-in. slimline lamps, mounted one inch apart, is supplied by magnetic frequency multipliers. The lamps are ballasted by individual capacitors, with major savings in weight, space and power loss in comparison with an supported by hangers of the disconnectventional 60-cycle ballasts.

Early in 1955 a large installation was made in the new Alumni Memorial Fieldhouse at Union College, Schenectady, New York. The 35 luminaires are of special design 8 ft wide and 8 ft long and each has 14, 96-in. T-12 slimline lamps. The resulting illumination level is 45 ft-c. Ballasting is by means of individual capacitors and chokes, one each on alternate lamps. Power factor is near unity at the lamps and total line current per luminaire is only 2.3 amp.

The 35 luminaires are installed in five rows of seven luminaires per row. Distribution circuits were planned so that every other luminaire is on a different circuit. The maximum number of luminaires per circuit is three and maximum line current per circuit is 6.9 amp. With No. 12 conductors the smallest used, the circuits are very lightly loaded and derating of switchgear and conductors is of no consequence.

Power for the Union College installation is supplied by two, 30-kw, 600-v, 400-cycle, 0.8 power factor generators with double delta windings and with midpoint leads brought out to a terminal block and grounded. Switching and circuiting are such that every other luminaire is on an alternate generator. Operation of either generator will provide well distributed illumination sufficient for some activities. This feature is of value in the event a generator is shut down.

In 1956, an installation was made at Argonne National Laboratories, near Chicago, Illinois. The installation consists of four luminaires made to special design and for plant growth research. Each luminaire contains 25, T-12, 96-in. slimline lamps and eight 150-watt incandescent lamps. The slimline lamps are on 2-in. centers and each is ballasted by an individual capacitor. Power is supplied by two 5-kw magnetic frequency multipliers.

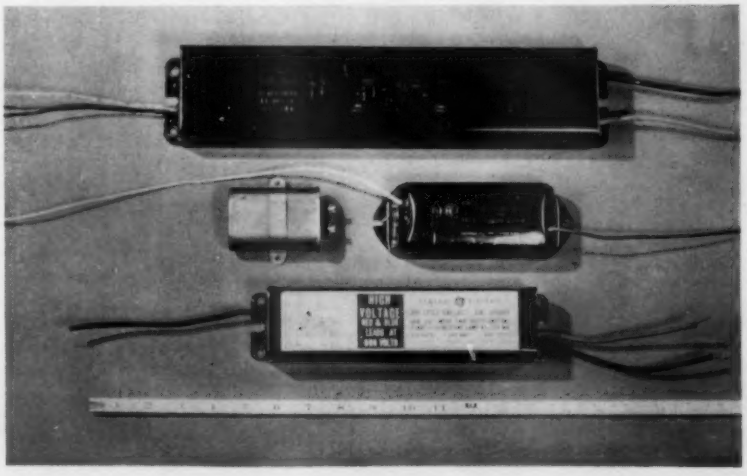
The Convention Hall in Camden, New Jersey is the first large area to be relighted with high frequency fluorescent lamps. To replace an incandescent system, thirty four large area luminaires were installed in 1956. Each luminaire is approximately 4 ft wide and 16 ft long and contains 16, 96-in. T-12, slimline lamps. They were assembled from eight tulamp luminaires converted from 60 cycles to 400 cycles. This installation was the first to use the new tulamp, 600-v ballast for 400 cycle. Power is supplied by a motor generator set.

Late in 1956, installation of luminaires was made in the fieldhouse of the University of New Mexico. These luminaires are also of the converted standard type and include two lamp, six lamp and ten lamp sizes. All are supported by hangers of the disconnect type for ease in maintenance.

Other applications of interest are an office lighting installation at Vermilion, Ohio; a fieldhouse at Northern Illinois State College at DeKalb, Illinois, a bank in Houston, Texas and a planned installation at Rochester High School, Rochester, Minnesota.

The case for high frequency fluorescent lighting systems seems quite clear. Early research revealed the potentialities; completed installations have established the advantages of high output, installation and maintenance; cost studies have detailed present and possible future economies. This should clear the way for many interesting and worthwhile installations of high frequency fluorescent lighting. END

Fig. 5. Standard 60-cycle 277-v ballast for two 96T12 slimline lamps, shown at top, weighs 9½ lbs. Capacitor and inductive reactor used at Union College, middle row. Latest 400-cycle 600-v ballast for two lamps, at bottom, weighs 3½ lbs.



Want Efficient Air Tools?

Design Compressed Air System Right

AUTOMATIC and semi-automatic pneumatic machines and tools are becoming more and more common throughout industry. The pneumatic tacker is an example of a modern air tool which is helping to increase productivity, while pneumatic nut-runners, impact tools, drills, etc., are other popular air tools.

Full potential of these machines can only be realized when the air systems which power them are adequate and correctly designed.

Maximum productivity with minimum maintenance and downtime from any pneumatic tool requires, according to Frank Ledwitz, manager of Technical Customer Service of Swingline Industrial Corp., Long Island City, N. Y., the continuous supply of clean, dry air at proper pressures. To provide this, the air supply system need not be elaborate, but it should be thoughtfully designed and installed.

Correctly and adequately specified compressed air systems cost little more than inadequate set-ups and proper installation is the most economical solution in the long run.

Compressed air is an economical, dependable type of power. However, moisture, line pressure drop and overloading are the three most common causes of trouble in most utility air set-ups.

Moisture and, to some extent oil, may be introduced into air lines from the compressor. In addition, moisture condenses in the air supply piping. Moisture in any air system may cause corrosion of the air tool, but even worse, if it combines with oil, the two will form a sticky emulsion to clog tools and lines.

In any air system the pressure of the air delivered by the compressor drops as it travels through the piping. The amount of the drop will depend upon the size of the pipe and the length of the run. The larger the inside diameter of the pipe the less the pressure drop over a given distance. Fittings, such as valves, ells, etc., cause greater pressure drop than equivalent lengths of straight pipe of the same size.

Overloading a compressed air system with more tools than it can handle will also cause pressure drop. If either the compressor or the distribution system is incapable of supplying the volume of air required by all the tools attached to it, the desired pressure cannot be maintained. Do not overload the system.

Foreign matter in the air lines is another common source of trouble. Dirt and dust present in the air taken from the atmosphere is filtered out before it is compressed by the compressor. However, dirt, rust and pipe scale may be picked up by the air passing through the pipes. These particles of foreign matter can clog lines and seriously impair the operation of any air tool.

Finally, air tools should be lubricated to insure optimum performance and life. Although they can be lubricated periodically by hand, the most efficient means of lubricating an air tool is automatically through the air supply itself.

The following suggestions should be helpful in the installation and operation of utility air systems.

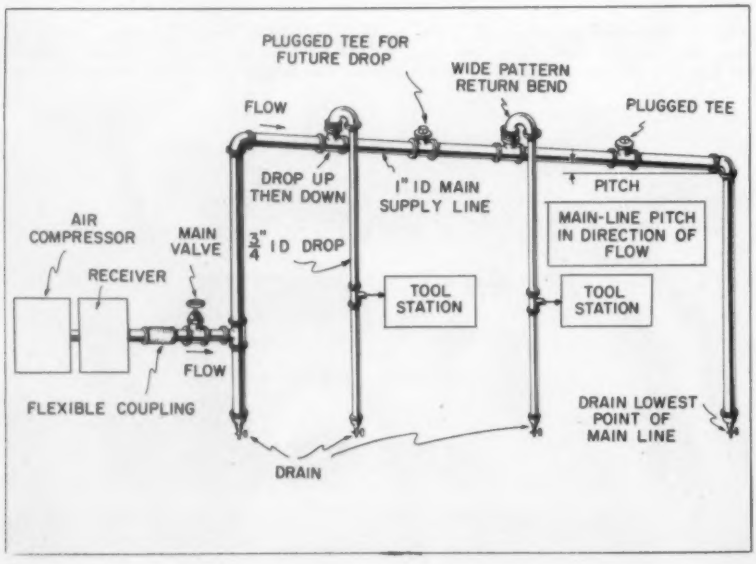
Quite literally the heart of the air system, the air compressor draws air from the atmosphere, compresses it to useful pressure and delivers it to the supply system. Obviously the compressor should be capable of supplying both present and expected future needs.

In addition, for proper operation:

1. Mount the compressor firmly and level in a well ventilated location. Do not obstruct its air intake. For safety, face flywheel to the wall.
2. Preselect the location of the compressor drain so that it is accessible and at pail height or higher.
3. Drain the compressor regularly as moisture conditions require. Sometimes it is the practice to operate with the petcock very slightly cracked so moisture will bleed out.
4. Inspect and clean the intake filter regularly.
5. Maintain and lubricate the compressor according to the manufacturer's instructions.
6. Since the compressor vibrates, it may be desirable to connect it to the air supply line through a flexible coupling.
7. Ideally, an air compressor should run only 25 per cent of the time. If it runs more than 75 per cent of the time, check for overloading, mechanical difficulties or leakage throughout the system.
8. Install a non-restrictive valve in the main line near the receiver outlet for overall system control.

The main air supply line (or head-

Fig. 1. Piping diagram for "dead-end" compressed air system for use with tools



er), see Fig. 1, distributes compressed air throughout the working area. Drops from it carry the air to the tools.

The main supply line should be large enough to prevent excessive pressure drop due to surge. Pipe should be at least as large as the receiver outlet and large enough to handle four times the maximum normal air requirements. Use at least ¾ in. or 1-in. ID pipe for air tacking equipment. Even larger sizes may be advisable in large compressed air systems. Adequately sized pipe costs very little more to install than smaller pipe since labor is the major installation expense.

A looped main air supply line is recommended wherever possible since it minimizes pressure drop throughout the system. The air pressure will be equal at all points within the loop. In the dead-end system, the farther a tool is located from the compressor, the lower the air pressure available to run it.

In addition:

1. Use good clean pipe, free of rust, scale and dirt.
2. Pipes obstruct the working area less if installed overhead.
3. Incline the main line downward in the direction of flow so all water will run to a known low spot, see Fig. 1.
4. Install a drain at every low point, having preselected these locations so that they are accessible and at a convenient height. Watch that drainage will not damage merchandise.
5. Install tee's above each working station with the branch of the tee upwards. If additional tool stations are expected, install plugged tee's at intervals so that future drops or main line branches may be connected without cutting the line.
6. Drain the line regularly or operate with drains cracked very slightly.

Individual Tool Station

The tool station, see Fig. 2, is the critical point. If the station is not set-up properly all previous precautions will be wasted. Starting at the junction of the drop and the main supply lines:

1. Come off the branch of the tee with a wide pattern return bend. Coming off the top of the header insures that no moisture will flow into the drop.
2. Use pipe of adequate size. If 1-in. ID pipe is used for the main air supply line, ¾-in. ID pipe will be large enough for a station of several air tackers.
3. Install a trap and drain at the bottom of the drop. Again, preselect its location and drain it regularly.
4. It may be convenient to install a valve of adequate size to enable you to shut off the station.
5. Install an adequately dimensioned filter. If it picks up one speck of rust or scale it will have paid for itself. Drain it when its transparent receiver shows the presence of moisture.
6. Regulate air pressure at the tool station to insure proper operation and staple penetration. Regulation here provides tool flexibility and is less expensive than regulation of the total air supply at the compressor outlet. Check periodically that operators are using proper working pressures.
7. Locate an automobile lubricator in the line near the tool. Make sure that it does not restrict the line excessively. Micro-fog type oilers are recommended. They will not spot the work and will allow use of longer hoses. Use a lubricator with a transparent bowl so that its oil level will be visible. Check operation of oiler, and its oil level regularly.
8. Use correct oil. It should be light weight, have little tendency to emulsify in water. Non-fluid oil is recommended.
9. Although the modern air tools have built-in air reservoirs, and air reservoir and check valve in the line insures ample air supply at the proper pressure at each gun. A 2½-in. ID pipe, 8-in. to 10-in. long can accommodate several air tackers.
10. Connect the air tool to this reservoir through a neoprene hose. Hose diameter depends upon working pressure and length. Hose of ⅜-in. or ¼-in. ID is recommended for 8-ft to 10-ft lengths at 100 psi and 70 psi respectively.
11. Connect hand tools either directly to the hose or through a ⅜-in. or ¼-in. neoprene pigtail. The pigtail permits use of a swivel while allowing the gun to be easily disconnected from are longer hose. Use non-restrictive, swivelling snap-type connectors with the self sealing side of the fitting in the high pressure side of the line.

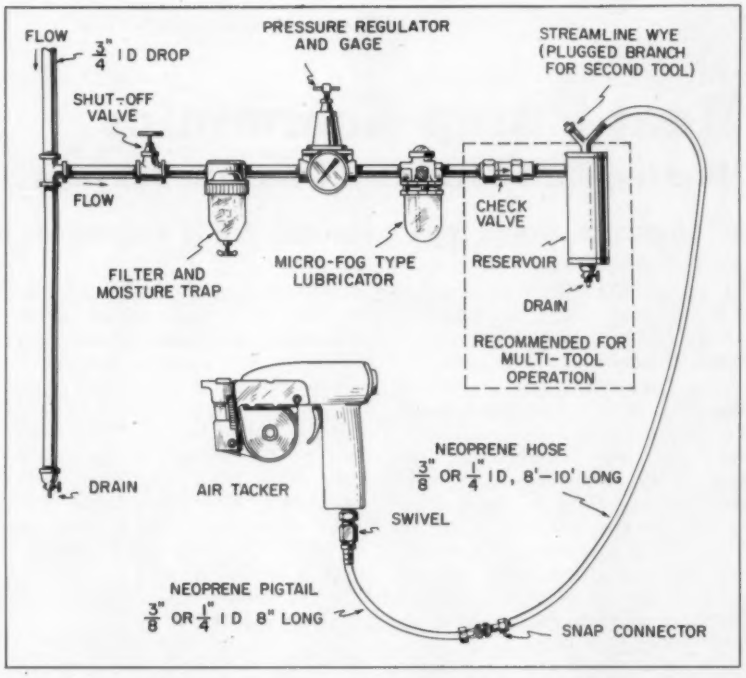


Fig. 2. Tool station details shows equipment, including air reservoir, installed in line

Finally, having specified and designed an adequate and efficient utility air system, install an efficient air tool at the payoff point. Here are two points which indicate a well engineered efficient pneumatic tool of the reciprocating type:

1. The tool should contain an integral air reservoir. The reservoir eliminates any possibility of a misfire due to excessive pressure drop resulting from too great a demand on the system at any moment.
2. Metal-to-metal contact between piston and cylinder in reciprocating air tools produces wear and scoring; subsequent leakage and waste of air; and eventual replacement of both cylinder and piston. Tools equipped with flexible O ring seals are more efficient and last longer. If excessive wear does occur eventually, only the O ring seal need be replaced to bring the tool back to new machinery efficiency. END

Heat Pump Economics

Heating Cost Estimates Indicate Savings

By SIDNEY M. MINER, York Corporation, Div. of Borg-Warner, Chicago, Illinois

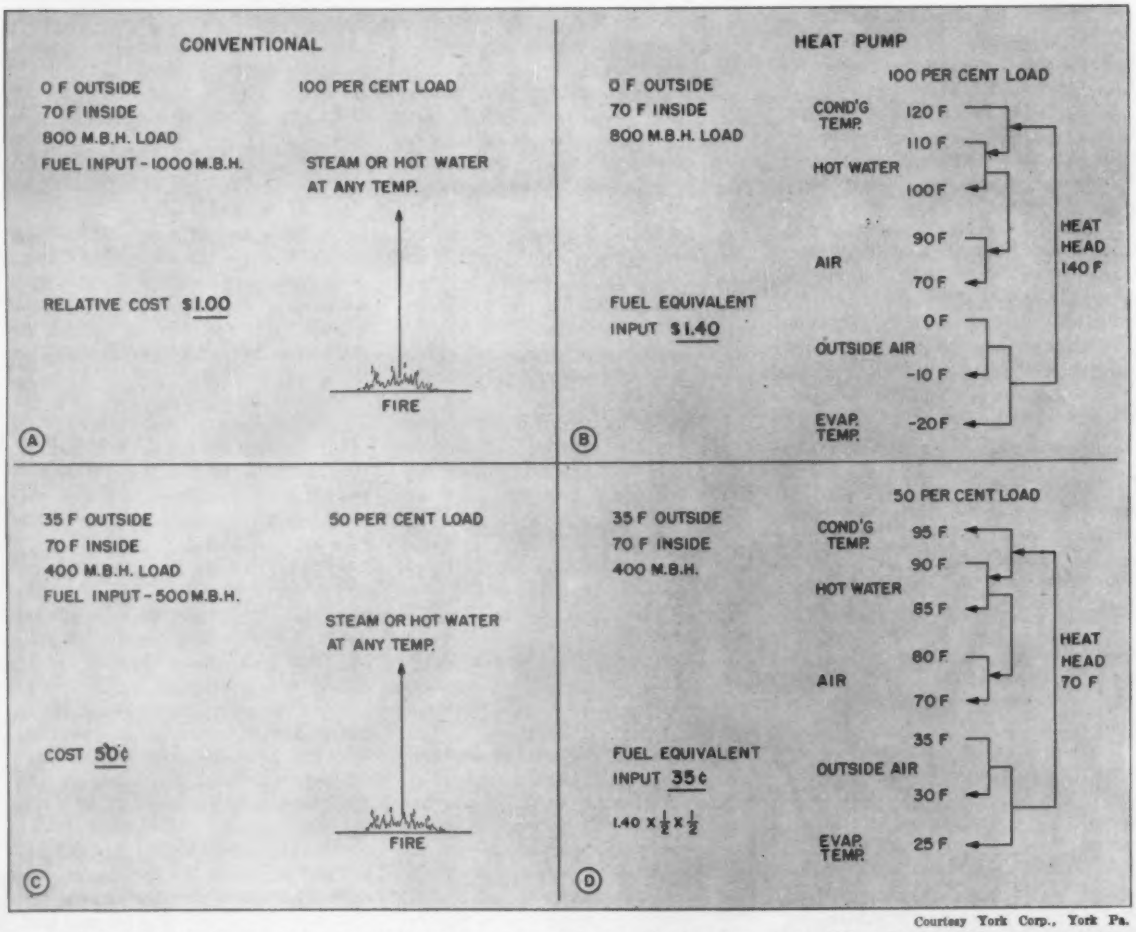
A BASIC CONCEPT in analyzing heat pump operating economics lies in recognition of the double influence of temperature levels—and combining this with a careful study of time duration at various temperatures. In addition, slipshod methods of load calculation cannot be afforded. Failure to recognize the influence of modern construction methods, excessive safety factors, ignoring influence of internal heat sources, provision for "warm-up" capacity in a system which operates continuously—all these will bias an economic analysis which must be made carefully in detail.

The term "coefficient of performance" may cause confusion. It cannot be estimated or used as freely as "degree days" or "average burner efficiency." C.O.P. at design outdoor conditions can be misleading as the system will operate relatively few hours during the heating season at this condition. A truer analysis can be made by determining system operation at various outdoor temperature levels. Each point of operation must be calculated in detail. This must then be extended from a detailed weather analysis and then combined with a careful rate structure calculation.

To understand the basic concept, refer to Fig 1. This is not a detailed calculation but rather a schematic description. Section A of the figure sets up the basic conditions. The Btu input would represent 80 per cent burning efficiency—somewhat high, but not of consequence to this analysis. Note that temperature levels are unimportant except as to effect on load.

Next refer to section B where load was dropped 50 per cent as a result of a 50 per cent rise in outdoor temperature differential. Depending on boiler burner combination, fuel input will drop to perhaps 50 per cent.

Now refer to Section C, where the same full load condition is taken for heat pump operation. Note here that



Courtesy York Corp., York Pa.

Fig. 1. Schematic study is basis for fuel-economy comparisons. It involves two different outside temperatures

the various temperature levels at which the system will operate are exceedingly important. They establish the "heat head" through which the system must operate, which in turn establishes the work input. Dollar value of heat pump input may be higher than fossil fuel on any given job at this condition. For the heat pump at half load refer to Section D. Note the effect of temperature changes on the heat head. Since heat transfer surfaces have not been changed, and since heat transfer is practically linear with temperature difference at constant surface, the temperature levels have been materially changed. The combined effect of reduced load and reduced head result in a materially reduced energy input cost.

Noting the overall comparison, it will be seen that the heat pump gains at reduced load (higher temperature levels) and loses at the lower temperature levels. Thus, the frequency of occurence and duration of time at various temperature levels becomes exceedingly important in this analysis.

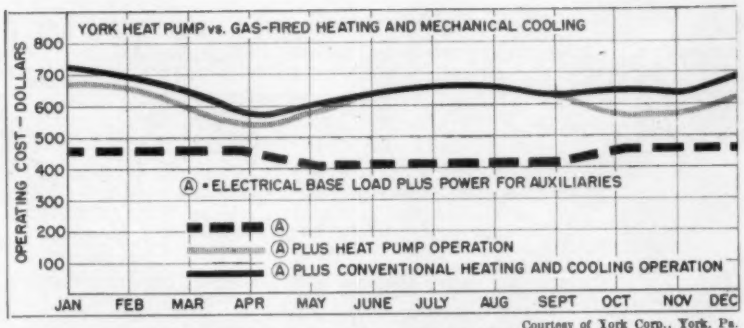
U. S. Weather Bureau Data

Data has been recorded by the U. S. Weather Bureau enabling calculation of number of hours at any temperature level. This data has been computed by us for most major cities across the country. The computations involve starting from degree days month by month for a given area, and working through to determine hours of expected operation over the range of outdoor temperatures. Maximum and minimum temperatures and degree days are recorded for each month.

Starting from the detailed weather data, and after computing system energy requirements over the range of operating conditions, the kw demand and kwh consumption is tabulated month by month for the year. This is a lengthy calculation which should be done for the individual job rather than on a general basis, if accuracy is desired.

System balance—a function of specific equipment—is important when figuring energy consumption on a compound system. Fossil fuel consumption is calculated on the basis of the same heating load calculations and using the degree-day method. The calculations must include separate analysis of base loads (lights and other electric equipment), auxiliary heating and air conditioning equipment (fans, pumps, etc.), summer air conditioning motors and winter heat pump motors.

The full tabulation of kw and kwh for each month for the heat pump system is matched with the utility rate structure and monthly electric bill estimated. The total is the annual cost of all power for lighting, miscellaneous electric loads, summer air conditioning and winter heating.



Courtesy of York Corp., York, Pa.

Fig. 2. An electrical cost analysis for an approximate area of 16,000 sq ft

On one project this was estimated at approximately $7345. The kw and kwh for the conventional system were estimated at $6500. Thus, the estimated cost of electric heat pump heating on this job was roughly $1000. Gas for conventional heating was estimated at $1200. Thus a savings of 20 per cent of the fuel bill was estimated for the compound heat pump system.

Figures pertaining to another job indicate a difference in total, annual electric bill of $7500. This difference represents additional cost of electric heat pump system for heating. Fuel cost, based on No. 5 oil was estimated at $11,000 annually. Thus, a savings of over 30 per cent on the heating cost.

Figure 2 shows graphically the results of calculations on one operating job. Base electric load is steady; the slightly higher winter base load is due to continuous operation of fan equipment. Summer operating costs are the same for either system (heat pump and conventional). However, the heat pump system shows an operating cost saving throughout the winter months.

In past years most generating plants experienced a total load that was much heavier in winter than in summer. With the advent of wide-spread air conditioning it is now the summer load that is heavier in many areas. All of this indicates an undesirable imbalance from the utilities' viewpoint as their capital investment in generating plants and distribution lines must be sufficiently large to handle seasonal peaks whereas they cannot realize sufficient income during "off" seasons.

Figure 3 portrays the annual load factor problem graphically, insofar as kilowatthour consumption is concerned. Actually, the power company is interested in yearly consumption versus peak demand. On a recent calculation the heat pump system required 445,000 kwh against a peak demand of 145 kw. This represents a usage factor of about 35 per cent. On the same installation, utilizing conventional heat-

(Continued on page 272)

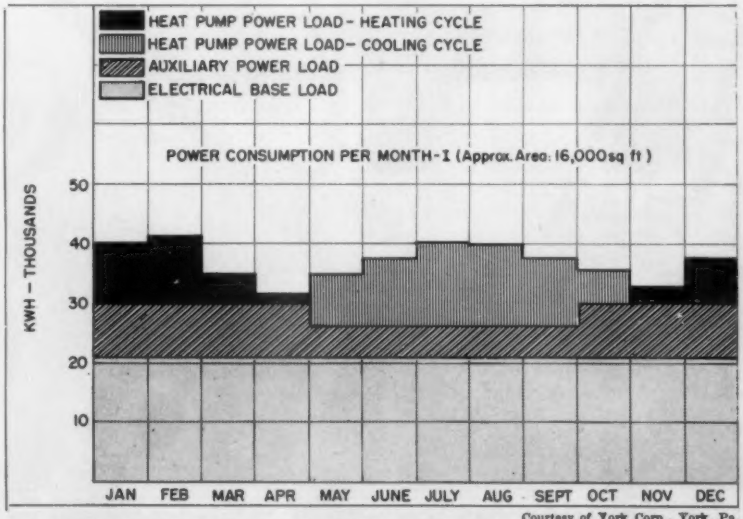

HEAT PUMP POWER LOAD – HEATING CYCLE
HEAT PUMP POWER LOAD – COOLING CYCLE
AUXILIARY POWER LOAD
ELECTRICAL BASE LOAD
POWER CONSUMPTION PER MONTH-I (Approx. Area: 16,000 sq ft)
KWH – THOUSANDS
50
40
30
20
10
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
Courtesy of York Corp., York, Pa.

Fig. 3. Effect of heat pump and auxiliary equipment on monthly power usage

BUILDING SURVEY

COMPANY Lake Shore Manufacturing Co BUILDING East End, Bldg. 3 COMPILED BY T.N.C. DATE 9/5/52

A. FLOOR ELEVATIONS AND CAPACITIES

L M	FLOOR MEASUREMENT FACTOR	BASEMENT	FIRST FLOOR	SECOND FLOOR	THIRD FLOOR	FOURTH FLOOR	FIFTH FLOOR	SIXTH FLOOR
1.	FLOOR ELEVATION ABOVE BASEM'T	0'-0"	18'-2"	30'-4"	45'-6"	58'-8"	71'-6"	86'-6"
2.	HEIGHT FROM FLOOR LEVEL TO CEILING	16'-0"	12'-0"	13'-3"	11'-0"	10'-5"	12'-0"	12'-3"
3.	FLOOR LOAD CAP.: LB/SQ FT	400	225	225	150	150	150	125
4.	FLOOR SURFACE: CONSTRUCTION	Concrete	Wood Blk	Wood Blk	Plank	Plank	Plank	Plank
5.	FLOOR SURFACE: CONDITION	Ramps	Good	Good	Fair	Fair	Poor	Poor
6.	BAY-SPACING BET WEEN COLUMN CENTERS	13'-13'	13'-13'	13'-13'	13'-13'	13'-13'	13'-13'	26'-26'
7.	GRADES ENCOUNTERED: WHERE		Connecting Bldg. 2					
8.	GRADES ENCOUNTERED: PITCH		12%	15%	15%			

B. VERTICAL TRANSPORTATION FACILITIES

L M	ELEVATORS AND RAMPS	BASEMENT	FIRST FLOOR	SECOND FLOOR	THIRD FLOOR	FOURTH FLOOR	FIFTH FLOOR	SIXTH FLOOR
9.	ELEVATOR NUMBER 1	☒	☒	☒	☐	☐	☐	☐
10.	ELEVATOR NUMBER 2	☒	☒	☒	☐	☐	☐	☐
11.	ELEVATOR NUMBER 3	☐	☐	☒	☒	☒	☐	☐
12.	ELEVATOR NUMBER 4	☒	☒	☒	☒	☒	☒	☒
13.	ELEVATOR NUMBER 5	☐	☐	☒	☒	☒	☒	☒
14.	ELEVATOR NUMBER 6	☐	☐	☒	☒	☒	☒	☒
15.	INTERFLOOR RAMP NO.1 12%	☒	☒	☒	☐	☐	☐	☐
16.	INTERFLOOR RAMP NO.2 15%	☐	☒	☒	☐	☐	☐	☐
17.	INTERFLOOR RAMP NO.3 15%	☐	☐	☒	☒	☐	☐	☐
18.	INTERFLOOR RAMP NO.4 15%	☐	☐	☐	☒	☒	☐	☐
19.	INTERFLOOR RAMP NO.5	☐	☐	☐	☐	☒	☒	☐
20.	INTERFLOOR RAMP NO.6	☐	☐	☐	☐	☐	☐	☐

C. OTHER INTERFLOOR HANDLING DEVICES

21.	CRANES	None
22.	HOISTS	Two at receiving dock
23.	LIFTS	None
24.	MONORAILS	None
25.	CONVEYORS	Network of waist-high conveyors on all floors; powered-belt and gravity-roller types
26.	CHUTES	None

D. ELEVATORS

L M	SIZE AND CAPACITY	ELEVATOR NO. 1	ELEVATOR NO. 2	ELEVATOR NO. 3	ELEVATOR NO. 4	ELEVATOR NO. 5	ELEVATOR NO. 6	ELEVATOR NO. 7
27.	POWER (ELEC OR HYDRA LIC)	Hyd.	Hyd.	Hyd.	Hyd.	Hyd.	Hyd.	
28.	SPEED: FEET PER MINUTE							
29.	LOAD CAPACITY: POUNDS	5000	5000	3000	3000	2500	2500	
30.	ELEVATOR CAR: HEIGHT	8'-2"	8'-2"	7'-4"	7'-0"	7'-0"	7'-0"	
31.	ELEVATOR CAR: DEPTH	8'-3"	8'-3"	7'-6"	7'-6"	6'-0"	6'-0"	
32.	ELEVATOR CAR: WIDTH	6'-6"	6'-6"	5'-4"	5'-4"	4'-0"	4'-0"	

E. RAMPS

L M	SIZE AND CONDITION	RAMP NO. 1	RAMP NO. 2	RAMP NO. 3	RAMP NO. 4	RAMP NO. 5	RAMP NO. 6	RAMP NO. 7
33.	FLOOR WHERE LOCATED	1	2	3	4			
34.	LENGTH OF RAMP	107'-3"	72'-8"	71'-9"	87'-6"			
35.	WIDTH OF RAMP	4'-6"	4'-6"	4'-0"	4'-0"			
36.	PITCH OF RAMP	12%	15%	15%	15%			
37.	RAMP SURFACE: CONSTRUCTN	Conc.	Conc.	Plank	Plank			
38.	RAMP SURFACE: CONDITION	Fair	Fair	Poor	Good			

F. DOORWAYS IN TRAFFIC AISLES

L M	HEIGHT AND WIDTH		BASEMENT	FIRST FLOOR	SECOND FLOOR	THIRD FLOOR	FOURTH FLOOR	FIFTH FLOOR	SIXTH FLOOR
39.	MINIMUM DOOR	HEIGHT	7'-0"	7'-2"	7'-6"	7'-2"	7'-2"	7'-6"	8'-2"
		WIDTH	3'-0"	4'-2"	4'-2"	4'-2"	3'-6"	3'-6"	3'-6"
40.	AVERAGE DOOR	HEIGHT	8'-2"	8'-2"	8'-2"	8'-2"	8'-2"	8'-2"	8'-2"
		WIDTH	4'-6"	4'-6"	4'-6"	4'-6"	4'-6"	4'-6"	4'-6"
41.	MAXIMUM DOOR	HEIGHT	10'-6"	9'-3"	9'-3"	8'-8"	8'-8"	8'-8"	8'-8"
		WIDTH	8'-2"	5'-8"	5'-8"	4'-2"	4'-2"	3'-6"	3'-6"

G. TRAFFIC AISLES

L M	WIDTH AND LENGTH		BASEMENT	FIRST FLOOR	SECOND FLOOR	THIRD FLOOR	FOURTH FLOOR	FIFTH FLOOR	SIXTH FLOOR
42.	MINIMUM WIDTH	WIDTH	10'-6"	8'-2"	9'-0"	8'-0"	8'-2"	8'-2"	8'-2"
		LENGTH	42'-2"	36'-0"	36'-0"	42'-2"	42'-2"	36'-0"	36'-0"
		QUANITY	4	5	5	4	4	3	2
43.	AVERAGE WIDTH	WIDTH	10'-6"	9'-6"	9'-6"	9'-6"	9'-6"	9'-6"	8'-2"
		LENGTH	96'-3"	90'-10"	90'-7"	96'-10"	96'-10"	78'-3"	78'-3"
		QUANITY	3	3	3	3	3	3	3
44.	MAXIMUM WIDTH	WIDTH	12'-0"	12'-0"	12'-0"	12'-0"	12'-0"	12'-0"	10'-0"
		LENGTH	96'-3"	96'-3"	90'-7"	96'-10"	96'-10"	78'-3"	78'-3"
		QUANITY	2	1	1	1	2	2	2

Fig. 1. Survey form for appraising problems of converting an existing building to accommodate modern handling equipment

Adapting Old Buildings to Modern Handling

Eleven Ways To Minimize or Eliminate Structural Problems

By A. T. GAUDREAU, Consultant, Gaud-Reau Associates

Photo: Whiting Corp.

Fig. 2. If the building won't accommodate an overhead crane, perhaps the yard will. Here's a 50 ft span crane making up charges in a foundry yard

MATERIAL HANDLING problems in old plants and warehouses arise mainly from the existence of structural limitations and transportation obstacles. For the most part, these impediments to the adaptation of modern material handling methods and devices can either be corrected or removed by making simple building alterations to accommodate a well-planned revised floor-transportation and storage layout.

1. Structural limitations in old plants

Among the structural limitations usually encountered in old buildings are the following:

1. Insufficient load-bearing capacity of some floors.
2. Improper placement of supporting pillars and columns.
3. Unequal floor elevations in connecting buildings.
4. Low ceiling heights.
5. Narrow and angular aisles.
6. Load-supporting walls subdividing floor space into "rooms."

7. Inadequate receiving and shipping docks.

8. Presence of overhead obstructions in the form of line-shafts and belts, piping, platforms and mezzanines.

9. Inadequate size and improper location of storage areas.

10. Absence of or inadequacy of facilities for vertical transportation in multi-story buildings.

These limitations present complications which inevitably require a more imaginative approach and planning than in the case of laying out a new plant. Yet, these inherent shortcomings do not necessarily preclude the possibility of an economic justification for transforming the building so as to adapt it to the proper operation of such modern material handling devices as fork trucks, monorails and conveyors.

A well-planned modernization program has often succeeded in converting an old style building into the equivalent of a modern structure by removing handling obstacles as well as by compensating for structural shortcomings at strategic or critical points. Building conversions of this scope have been made successfully in structures dating back over 100 years and which are held together by wooden girders and columns for three or more stories in height.

In many cases, in fact, suitable alterations can usually render an old building fully as adaptable to the use of mechanical handling devices, with the possible exception of overhead traveling cranes, such as are being installed in present-day plants and warehouses. In some cases, however, these cranes can be installed with equal effectiveness in the plant yard, as shown in Fig. 2.

2. Material Handling survey of a building

In checking over an existing building for the purpose of appraising its adaptability to the introduction of modern material handling methods, the points to note in particular are primarily dimensional in character.

Whether the building is a single-story or multi-story structure, it will usually involve the same appraisal points, except for elevators in the material handling survey. The building characteristics which need to be surveyed in making such an appraisal may be grouped as follows:

A. Floor elevations and capacities.
B. Vertical transportation facilities.
C. Other interfloor handling devices.
D. Elevators.
E. Ramps.
F. Doorways in traffic aisles.
G. Traffic aisles.

A convenient form for making a building survey which includes all of the foregoing characteristics is illustrated in Fig. 1. The data called for on this form are usually ample to gage the status of an old building as regards its suitability for alterations to accommodate modern material handling devices. This initial approach should, of course, be implemented with floor plans showing building outlines, columns, stairs, elevators, traffic aisles, walls, partitions, doorways, loading platforms, ramps and all fixed obstacles which are a part of the structure.

3. Planning material flows through buildings

Cost of handling material is some-

Fig. 3. Caterpillar Tractor's Peoria plant has one of the neatest, most extensive outdoor storage areas in the country. It is the result of careful planning

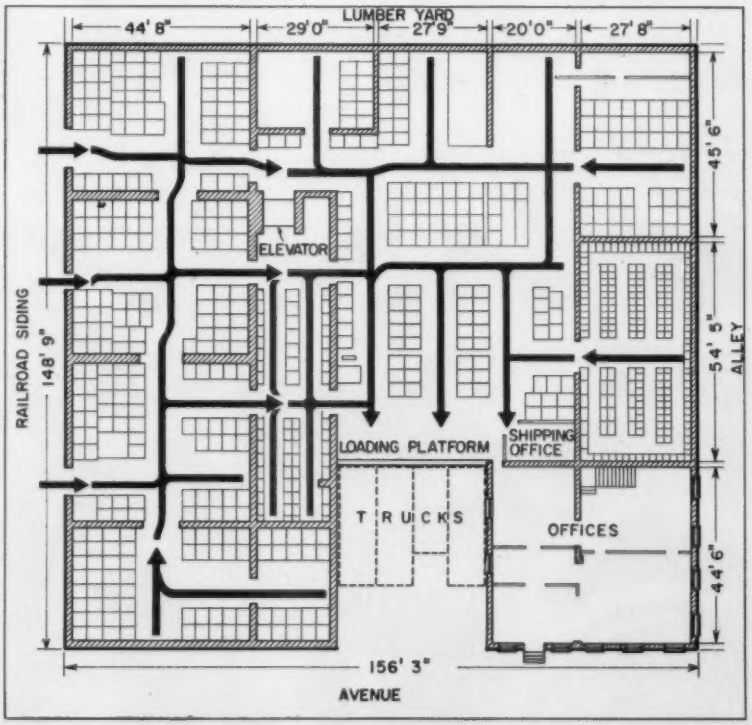


Fig. 4. Integrated flow of product through several adjoining buildings resulted in convergence of product at shipping dock shown in lower portion of drawing

Fig. 5. This supply company in Tulsa was located in a rented building. It solved its interfloor movement of goods by installing this outside vertical lift

times an unduly heavy burden, oftentimes self-imposed because of improper plant layout, of lack of programming of operational sequence, and of inadequate facilities for receiving, warehousing and shipping materials. A solution to inadequate storage space and structural limitations is frequently obtained by storing materials in the yard where mechanized handling can ordinarily be achieved freely without involving structural alterations, as shown in Fig. 3.

It is of primary importance, in the interest of economy, therefore, that a scientific plan be developed to integrate the flow of material through plant operations and warehousing activities. To be effective, this plan calls for an over-all flow of material through the plant as governed by an integrated layout of storage and manufacturing areas. It should insure the accessibility of material at all times, and the handling and dispatch of it without delays, interruptions and re-handlings to meet production schedules in plants and order-filling requirements in warehouses.

An example of an integrated flow of merchandise through a cluster of 12 adjoining buildings constituting a wholesale warehouse is given in Fig. 4. Originally constructed as a brewery, and later converted into a packing house, this set of buildings occupying 14,317 square feet of ground area, consists of 12 different structures put up at various times without evident regard to differences in adjoining floor levels. The buildings are grouped into a solid U-shaped pattern surrounding the open-court area leading out to the street along the foot of the chart.

To set up the pattern of a coordinated and continuous flow of merchandise through these 12 buildings, the direction of movement was laid out as follows:

1. From railroad siding at left to loading platform in center foreground.
2. From storage areas along alley at right to loading platform in center foreground.
3. From storage areas along lumber yard property line at top to loading platform in center foreground.

By cutting necessary doors through intervening walls, a fully integrated flow of merchandise was made possible. The plan was designed around a checker-board network of aisles converging from three boundaries of the premises to funnel all shipments through the centrally-located loading platform.

4. Compensating for building shortcomings

Examples of alterations made to existing buildings to compensate for structural shortcomings from a material handling point of view are now fairly commonplace items in industrial publications and engineering treatises. Unfortunately, many of the alteration possibilities are at the discretion of construction engineers who may not be sufficiently versed with the features of material handling devices, as in Fig. 5, to visualize the proper alterations which may be drawn upon in modernizing old plants and warehouses.

On the other hand, when these alteration possibilities are being sought from handling equipment representatives, these men may not be sufficiently familiar with building construction work to clearly visualize the most suitable alterations possible for a given structure. It behooves the management of the business in the existing building, therefore, to reconcile the contractor's views with those of the

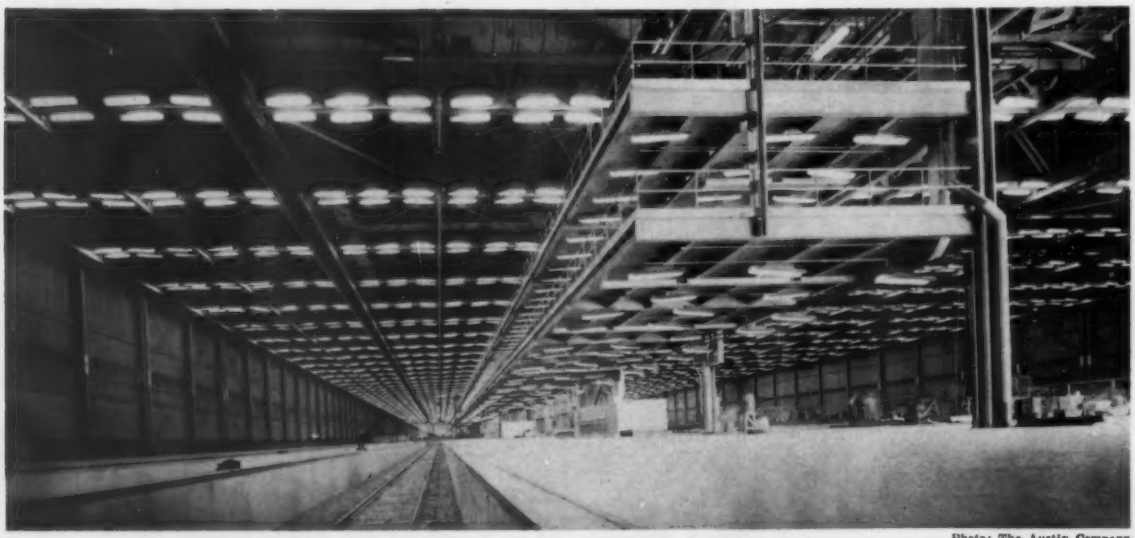


Photo: The Austin Company

Fig. 6. Second and third floor balconies receive goods directly from the railroad dock by means of overhead cranes

equipment salesmen in order to arrive at fairly appropriate and economical plans for overcoming the material handling handicaps inherent to the old buildings.

At the Nash-Kelvinator plant in Lansing, Michigan, the first floor in one building had a roof-truss height of 14 ft, whereas that on the same floor level in the adjoining building had only 11 ft of overhead clearance. Since the general pattern of work flow was in a straight-line movement in this plant, the layout was rearranged so as to avoid vertical movement at low points in order to join higher-level movements at others.

This was accomplished by relocating the machinery to permit complete utilization of limited overhead space without resorting to special material handling methods. The production line was laid out to begin on machines not exceeding the 11-ft head limitation and proceed thence to the high machines in the 14-ft building. The work would then flow to the 11-ft building where the headroom was adequate for succeeding operations.

5. Floor pits to facilitate material handling

Additional floor space at ground level can sometimes be secured on an existing floor by digging up a pit below the floor level and covering this opening with removable flooring or draw-bridges. At the American Seating Company plant in Grand Rapids, Michigan, sunken pits were dug in the floor of the pressroom to permit the storage of press accessory parts near their point of use; namely, at the presses. These pits are closed by crane-operated reinforced covers which permit fork trucks to run over the pits.

The two benefits gained from the introduction of these pits were:

1. Floor space formerly taken up by press accessory parts was saved and made available for other uses, such as traffic aisles and additional presses.

2. The transportation distance of these parts from former floor storage spots to the presses was virtually eliminated.

Other instances of sunken floor pits being dug to increase space utilization exist in the case of providing additional headroom in the low-ceiling areas. To provide the requisite headroom for handling large parts in and out of pot furnaces in heat-treating processes, for example, sunken pits can be dug into the floor, and the furnaces located in these pits. This arrangement facilitates the handling of batches of parts by chain hoist in and out of the furnaces without the handicap of insufficient headroom.

Similar situations abound in warehouses also. To permit floor level unloading from highway trailer beds, sunken pits have been dug 44 in. below floor level and connected by ramps to the warehouse floor. The beds of trailers driven into these pits are flush with the warehouse floor and thereby enable fork trucks to move freely on and off the trailer beds. When not in use for unloading purposes, these pits are covered over for use as traffic aisles at floor level.

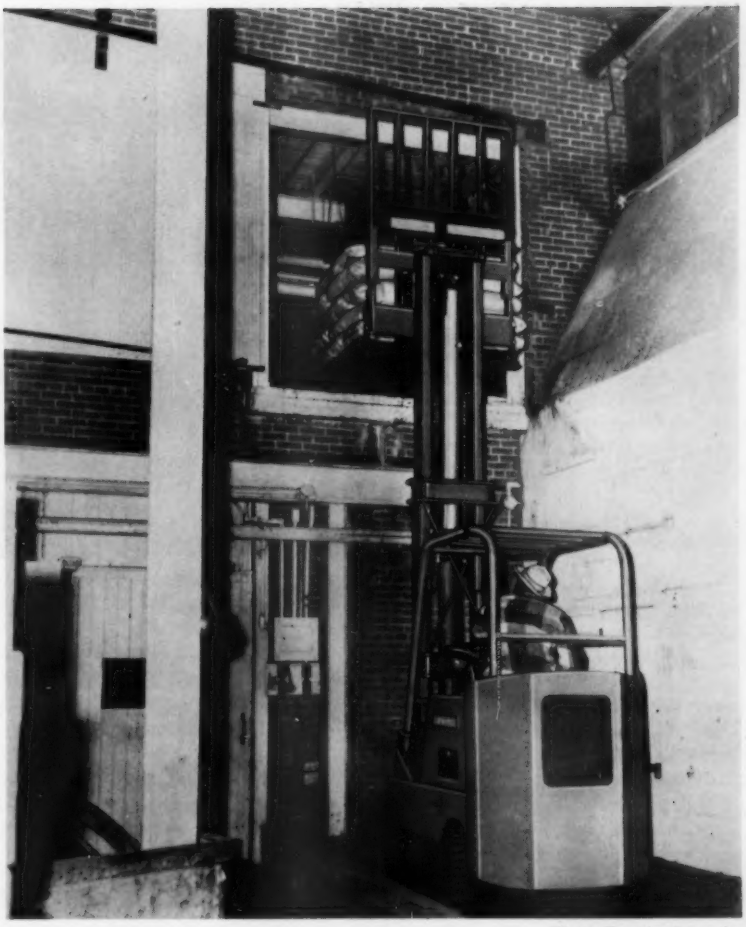


Photo: Towmotor Corporation

Fig. 7. Interfloor handling of sugar sacks in 3000 lb pallet loads is accomplished by means of a fork truck at the food plant of J. M. Smucker Co., Orville, Ohio

6. Balconies and mezzanines over operating floors

Besides digging sunken pits into the floor, another effective method of increasing floor space within a fixed area is to erect balconies which can be served directly from material received at floor level.

Suspended mezzanine balconies built at two levels above a long receiving platform, as shown in Fig. 6, is a case in point. This arrangement was installed at the Consolidated-Vultee aircraft plant at Fort Worth, Texas. It permits the transfer of materials from the dock level direct to the mezzanines by the free operation of traveling cranes hoisting material to overhead conveyors serving each balcony.

Balconies can also be served by fork-lift trucks operating at floor level. Oftentimes, because of the nature or variety of the material stored on the floor, it is not practical to stack the material up to the ceiling, one item on top of another. The use of a balcony at an intermediate level in such cases brings into use an added amount of storage space which would not otherwise be made available as floor space.

Another application of serving mezzanine levels from ground levels without resorting to elevators is illustrated in this food plant, Fig. 7. The fork-lift truck at ground level is depositing a palletized load of sugar sacks on a mezzanine floor through a door which was cut for this purpose through an outside wall.

In some states this method may conflict with statutory elevator codes unless the fork-lift trucks can be interpreted in this application to be a "portable elevator" such as in the

case of two-post hand-crank stackers.

7. Leveling off floor heights in a building

In the process of expansion many a plant and warehouse building has been extended into an adjoining structure, or perhaps into a row of them, with floor levels out of alignment with each other. In the case of upper floors, these differences in floor levels between adjoining buildings can usually be overcome by installing elevators between the two buildings, or by building connecting ramps from one floor level to another in different buildings. When these differences exist in first-floor levels, however, ramps rather than elevators are usually more practical in order to provide continuity of flow in the floor traffic.

The method used in connecting three different first-floor levels in a wholesale warehouse comprising three adjoining buildings is one example. Continuous, on-the-ground movement through these three buildings was blocked by these changes in floor levels. Furthermore, the tremendous diversity of merchandise carried would have made extensive overhead conveyor facilities awkward and uneconomical.

Recognition of the "lift" function of fork-lift trucks, in addition to their transportation function, indicated it was possible to use these units to overcome differences in floor level. Lift trucks operating on the low level in this warehouse now deposit their pallet- or skid-loads on the elevated dock, to be picked up by trucks operating on the higher level on the receiving and shipping platforms.

Where non-powered floor trucks are pushed manually, however, the use of ramps to level off differences in floor heights may add hardship to the operation and thus require additional men to handle the loads up and down the inclines. Inter-floor transportation in these circumstances may be greatly facilitated and economized by the use of hydraulic platform lifts stationed at strategic points along the breaks in the floor levels.

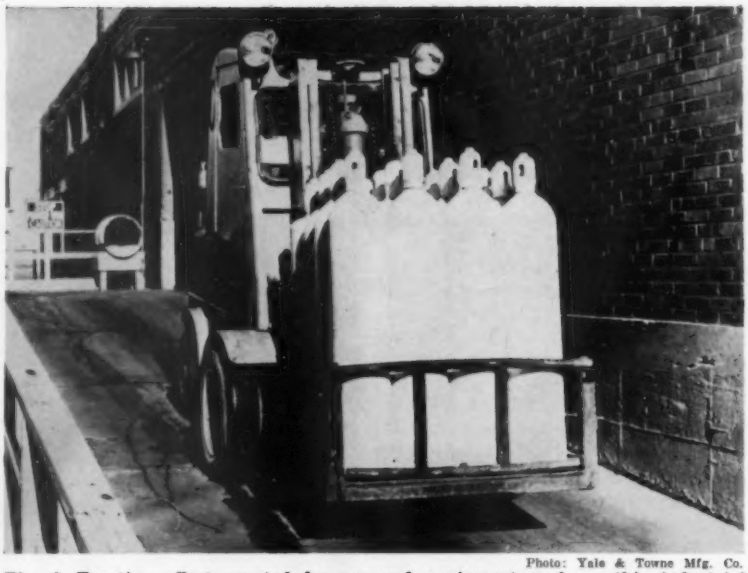


Photo: Yale & Towne Mfg. Co.

Fig. 8. Tractive effort exerted by powered equipment such as this industrial truck is influenced by the type of surfacing on the ramp and its condition

8. Leveling off carrier heights on loading platforms

Receiving or shipping docks which are not at the right height for unloading or loading highway trucks or rail cars are not uncommon in old buildings. When the disparity is relatively small, say not over 10 in., between dock level and carrier-bed height, the following adjustments may be made to connect these two levels:

1. Portable ramps are often used to bridge these levels.

2. Hydraulic ramps may be installed at each carrier spot to provide quick, automatic adjustment between dock height and carrier bed, but their higher cost is not always justified when compared with the portable ramps.

3. Portable conveyors reaching from the dock and penetrating inside the carrier offer a level transportation surface for handling individual items or packages by hand, one object at a time, but do not solve the problem when palletized loads are trucked in and out of carriers.

4. Telescopic conveyor booms reaching into the carrier are likewise confined to the manual handling of but one package at a time.

5. Excavation or filling of ground

(Continued on page 273)

Table I. Listing shows resistance factors of traction, grade and acceleration

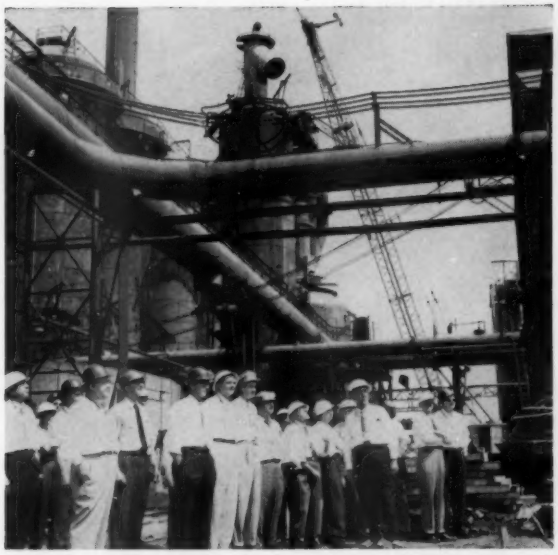
1. Traction—Resistance per ton of weight hauled		2. Grade—Resistance per ton of weight hauled		3. Acceleration—Resistance per ton of weight hauled	
Type of surface on aisle or runway	Lb per ton	Per cent grade or incline	Lb per ton	Acceleration—fpm per second	Lb per ton
Asphalt, hard	28	1 per cent	20	30 fpm	30
Brick, smooth	40	2 per cent	40	35 fpm	35
Brick, poor	57	3 per cent	60	40 fpm	40
Concrete, good	36	4 per cent	80		
Concrete, poor	53	5 per cent	100		
Gravel	75	6 per cent	120		
Macadam, good	47	7 per cent	140		
Macadam, poor	75	8 per cent	160		
Sand, normal	275				
Sand, loose, 3 in.	330	9 per cent	180		
Wood block	40	10 per cent	200		
Wood planking, normal	43				
Wood planking, sticky	47				

These three tables were taken from the U.S. Army Manual No. 67-9, page 27.

Definition of ton of weight: Gross weight of the truck or tractor plus the weight of the load carried, plus the weight of the driver.

Table II. Example of calculations necessary to determine tractive effort

Tractive Effort		Gross Weight		Traction Resistance		Grade Resistance		Acceleration Resist.	
TE	=	10 tons	(	53 lb	+	100 lb	+	35 lb	)
	=	10 tons	(			188			)
	=	1,880 pounds of tractive effort per ton of gross weight.							



Members of the Pittsburgh Chapter of the AIPE see the sights at the Neville Island (Pa.) Works of the Pittsburgh Coke and Chemical Co. Each year the Chapter tours a different industrial plant

Activities of Plant Engineers' Societies

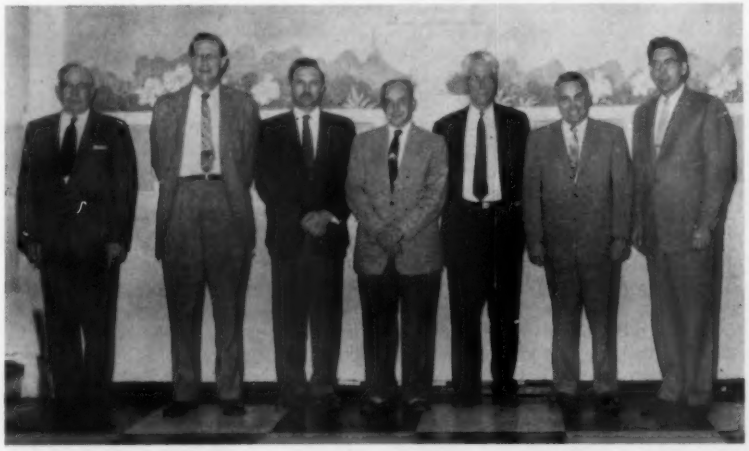
AS THE NUMBER of Plant Engineers' Societies increase so will their activities. Following is a brief report of what some of these Societies are doing:

New Jersey Joint Meeting

One of the significant events this year was the joint April meeting of the two New Jersey Chapters, Union-Middlesex and New Jersey. An attendance of about 50 also included many members of the New York and Philadelphia Chapters. This meeting was the first Regional Meeting to be held in the East. A joint meeting of the Midwest Chapters: Northern Illinois, Chicago, Milwaukee and Twin Cities has been held annually for several years.

At the New Jersey meeting N. Marchak, President of the New Jersey Club, presided. Short talks were made by Frank Marken, Jr., President of the Union-Middlesex Chapter; Bob McCaw, National Vice President; and John Waligora, National President. Dick Morris of PLANT ENGINEERING spoke on, "Engineering in Russia" based on a month's travel in the U.S.S.R.

John Waligora outlined AIPE program and objectives for 1957 as: Reorganization of committees on a geographical basis so as to facilitate committee work; the organization of a new chapter in each region; regional meetings or one-day conferences in each region annually; membership in the Engineers Joint Council; continued development of the AIPE News Digest; and continued emphasis on promoting the professional status and standing of the plant engineer in industry.



New officers and several members of the Los Angeles Chapter pose with Dick Morris during his attendance at one of their recent meetings. From left to right are: Jim Weeks, Proto Tool Co., national delegate; J. S. Cullison, North American Aviation, Inc.; M. S. Bolzer, Harvey Machine Co., secretary; G. A. Evans; Dick Morris; C. A. Gallaher, Aeronautical Div., Robertshaw-Fulton Controls Co., president; and W. H. Slater, of Emsco Manufacturing Co., vice president

Chicago

New officers were elected at a recent meeting of the Chicago Chapter. They are:

J. Balla, Kellogg Switchboard & Supply Co., president; G. H. Glos, Jr., Pettibone-Mulliken Corp., vice president; and J. F. McCracken, Ace Carton Corp., secretary-treasurer.

H. J. Seither, Jr., International Harvester Co., and J. Kucho, Link-Belt Co., will serve as Senior and Junior Board Members, respectively, for the coming year.

S. A. Simonson, (Chicago Hardware Foundry Co.) member of the Northern Illinois Chapter and Regional Vice President of the AIPE attended this meeting. He informed the Chicago Chapter what took place at the AIPE Executive Committee meeting held in Philadelphia.

Greater Philadelphia

At one of the recent meetings of the Philadelphia Chapter, Dick Morris presented a talk on: "Engineering in Russia." Preceding the meeting, he was presented with a gold cigarette lighter from the Plant Engineers' Club of Greater Philadelphia In addition to the lighter, they presented him with this citation:

"We have benefited from the results of your untiring efforts through

(Continued on page 274)

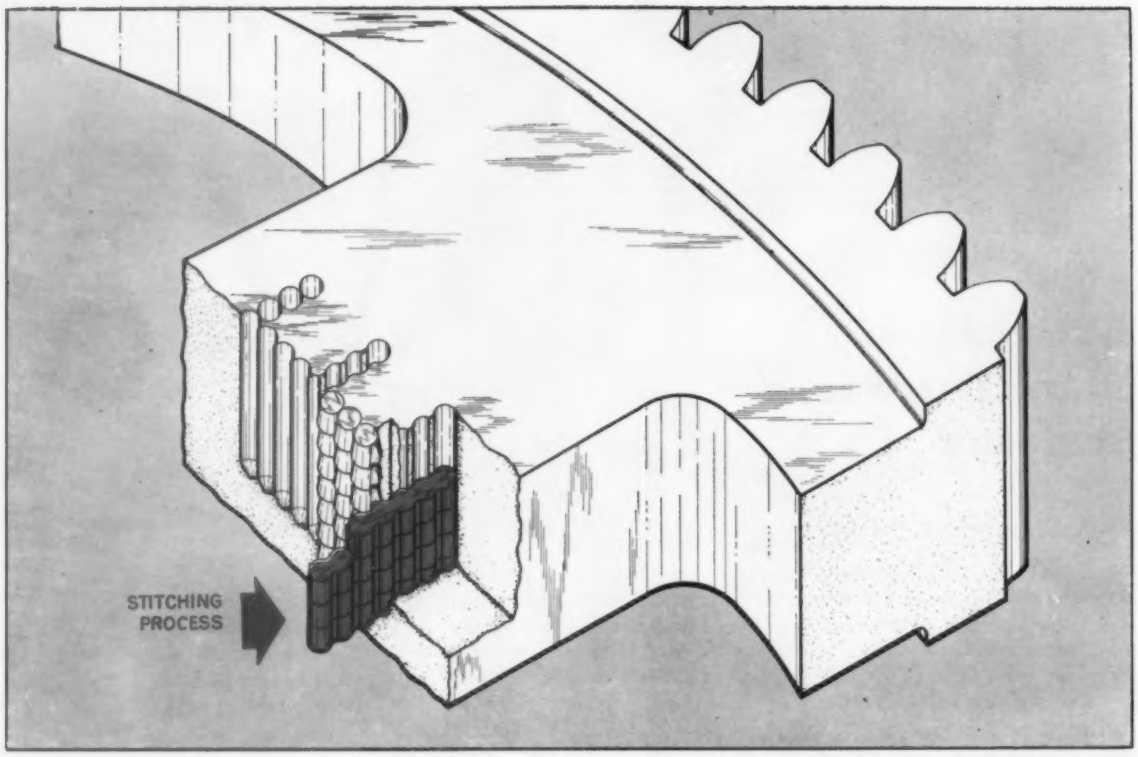


Fig. 1. The illustration shows the general manner of applying metallic sutures (in color) to repair a machine part

Cold Metal Machine Repair

Casting Fractures Are Stitched With Alloy Bars

By R. L. RECTENWALD, Maintenance Engineering Corp., Pittsburgh, Pa.

AFTER failure has occurred or a fracture has been detected, the next step in the rehabilitation of any large machine is to determine the cause. This perhaps is the most important part of the rehabiliation, since success or failure of the repair often depends on just how thorough and astute the surveyor has been in determining cause and laying out a plan for repair.

If the cause of the failure or fracture cannot be determined in the initial survey or if the best possible correction method is believed to be marginal, the repair should be abandoned. If cause of failure is found to be misalignment of moving parts, worn bearings, defective material, which can be corrected, a repair plan should be laid out.

Strength and physical conditions of the parent metal should be appraised. If the equipment is subject to corrosion, it is necessary to study the effect of corrosion and galvanic action. On all temperature applications it is necessary to judge the effect of temperature upon the repair and compensate for undesirable effects. If it is impossible to determine the magnitude of stress, there should be good estimates available on the direction of the principle stresses. Unless the repair can be undertaken with complete effectiveness and with assurance of meeting all code requirements, it should be abandoned at the beginning.

Part of the initial survey is the determination of repair method. The choice of method will depend on the extent of damage, the kind of material being repaired, stresses and strains that might be introduced as a result of the repair, time involved, and economics. Until just a few years ago, welding or brazing were the only methods available for repair. Newer methods in cold metal working now make it possible to repair a wider variety of materials and defects.

Perhaps one of the biggest problems in equipment repair is the type of material and inherent difficulties in fabricating or welding. Cast iron, probably the most popular choice for making large machine sections, is a difficult material to repair. This has long been recognized. However, high strength cast irons have been developed which compare favorably with steel casting materials. They have excellent damping qualities and a wide range of physical and chemical properties that are hard to match. We can expect to see their continued use for large machine parts.

In the repair of any casting or weldment by fusion methods and particularly with cast iron, the problem of shrinkage of the weld metal is difficult to overcome. The results are harmful residual stresses, warpage, and sometimes failure of the repaired section during weld cooling. Preheating and normalizing after welding does relieve

some residual stress, but this is sometimes difficult to accomplish on the site without machine disassembly.

Tensile strength of all common metals is enhanced by cold working. It is often desirable to induce compressive stresses in a surface normally subject to high tensile strength. Also, the technique of sealing against pressure by caulking of ductile metals has been known as an emergency expedient for many years. These two techniques were combined to form the basis for Mecostitching, an improved method of metal insert repair.

In this method, a metal suture, a bar of high strength alloy "crimped" at regular intervals, is imbedded across the fracture. See Fig. 1. The completed stitch has studs for caulking and preloading in place.

The metal suture resembles a number of cylinders joined by straight sections. The number of "cylinders" or lugs on each side of the fracture determines the shear resistance or holding strength of the repair. The sutures are installed in slots across the fracture to a depth of 75 to 90 per cent through the section.

These slots are made by drilling a series of holes on each side of the fracture. By using a drilling template in drilling the holes for the slots, it is possible to leave a web between holes that is equal to one-fourth the diameter of the holes. This web is then cut out with pneumatic tools. The sutures are then upset and swelled into the slot by cold working. Successive locks are then driven in to form multiple layers.

Thickness of suture used depends on the depth of penetration desired. In a section three inches thick, for instance, sutures 1/4 to 3/16 inches thick would be used. The spacing between sutures is also dependent upon the fracture and the size suture used. The sutures are spaced along the fracture in line with the apparent stress.

The next step is to fill the fracture with a series of studs or a combination of studs and dowels tangent to each other. The lacing consequently formed is upset much the same as the sutures and a continuous line of metal is thereby caulked into the fracture to form a lace. This lace forms a pressure-tight joint and serves also to preload the sutures in tension, which thereby provides the means by which fatigue failure is avoided by reversing stress in the sutures. The preloading is also insurance against any looseness. The resultant joint efficiency is frequently 100 per cent or better in cast iron. Of course, in steel it is reduced inversely as tensile strength increases.

In addition to its ductility, the high nickel (35 to 60 per cent) steel used for the sutures can be provided with

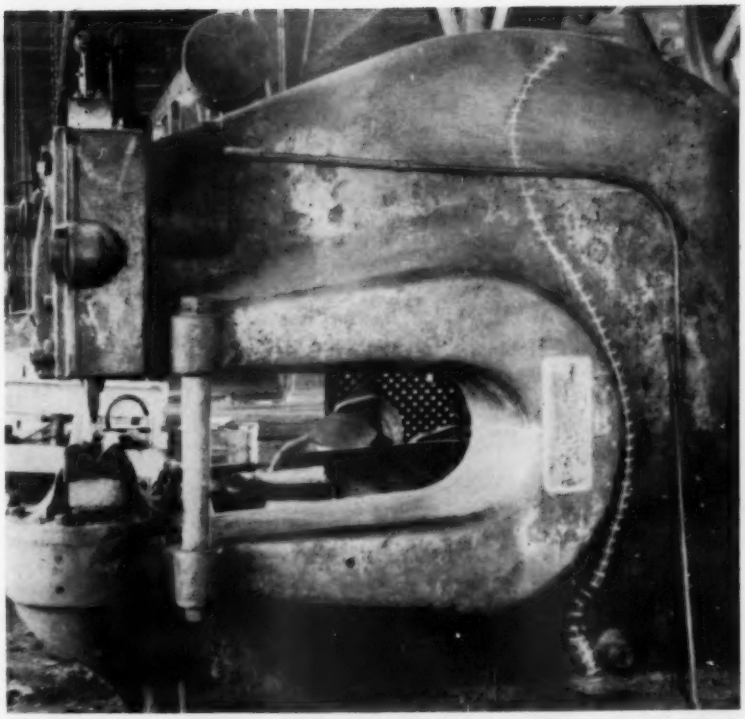


Fig. 2. Stitching of throat and frame restored this press to productive life

Fig. 3. Suture alloys' expansion rates compared with those of other metals

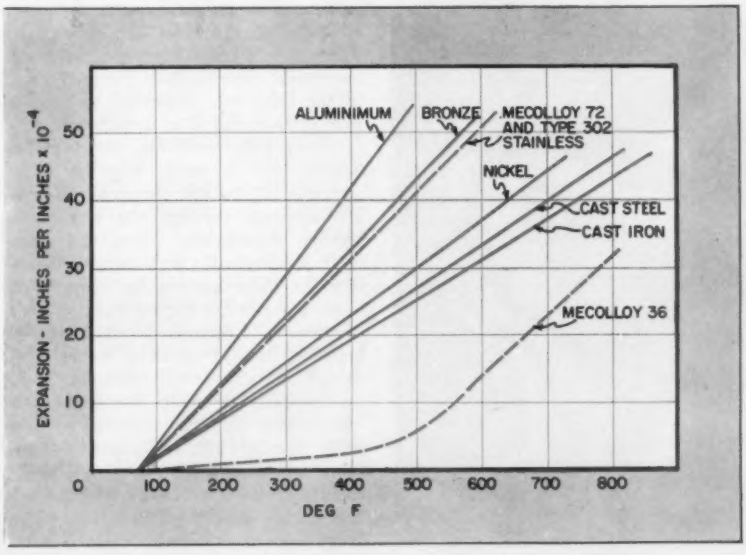
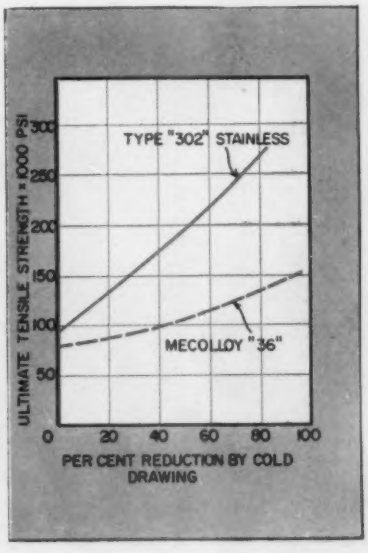


Fig. 4. Cold work and strength curves



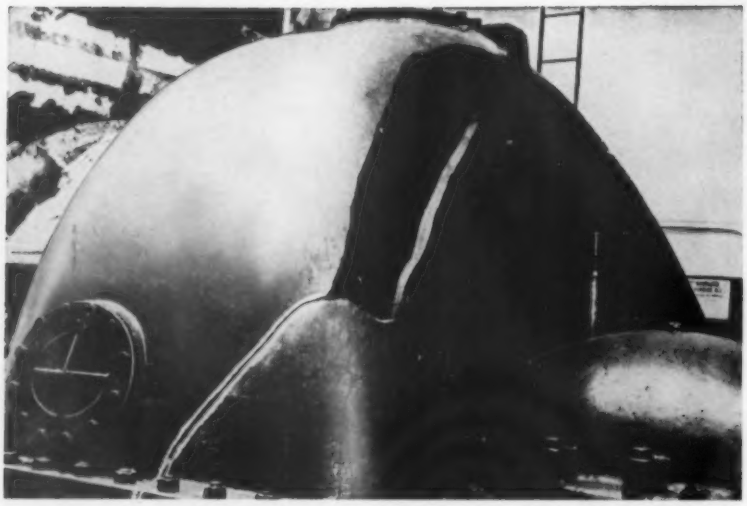


Fig. 5. Damage to steam turbine casing resulted from an internal explosion

Fig. 6. The turbine casing shown in the top view after completion of repair

Fig. 7. Crankshaft of power plant diesel was repaired and put back in service

a wide range of thermal expansion properties. The lower nickel alloy has a very low coefficient of expansion and the higher nickel alloy expands at about twice the rate of mild steel in a given temperature range. Hence, the low expansion alloy is used in applications subject to high temperature to take advantage of the parent metal in preloading the joint.

Average expansion rate of the material used in the sutures is shown in Fig. 3. The expansion curve for the low nickel alloy shows a break at about 400 F. Beyond this point, the expansion proceeds at about the same rate as mild steel. Hence, the low nickel alloy can be used in applications subject to high temperature to take advantage of the thermal expansion of the parent metal in preloading the joint. The high nickel alloy would be used on low temperature applications, such as liquefaction equipment.

This suture material develops exceedingly high physical properties when cold worked. See Fig. 4. The limiting factor is the ductility which the alloy has throughout the cold working process. In some cases, such as in austenitic alloys, the worked material hardens so fast that maximum strength and hardness are obtained before the locks can be completely imbedded into the parent metal.

Reinforcement

In some cases reinforcement is needed in addition to the standard sutures. Reinforcing plates are used in these applications. These plates are large slabs of steel, sometimes several feet in length, depending on the application. The bond is formed by cutting half-holes at closely spaced intervals around the plate. Half-holes are then cut in the casting to exactly match the half-holes in the plate. After the plate is installed, the holes are reamed to form perfect holes from the matching half-holes. Short dowels are then upset in the holes and expanded to form a firm body-bound fit in each hole.

When fully installed, these plates usually have at least twice the shear strength around the perimeter as tensile strength through the transverse section. Reinforcing plates are often used to dissipate high local stresses such as those around the corners of bearing chucks of engine frames. They are also used between internal rigs or between heavier sections to form a bridge across weaker sections. Mild steel reinforcing plates are sometimes locked into cast iron sections so that other members can be welded to them, thus combining a casting with a weldment. Often times, bosses, ribs, guides, and other appendages are secured in large iron castings with these plates.

Types of failures and the kinds of machines that have been repaired by the stitching method described in this article comprise an extremely wide cross section of general industrial equipment and faults. The press in Fig. 2, for example, suffered a complete fracture through the throat and frame, totally disabling it. A very standard stitching job restored it to its original strength and usefulness. This is a good example of a very frequent accident and one which could possibly be avoided by maintaining a rigid maintenance inspection program.

The steam turbine casing in Fig. 5 was wrecked as a result of an internal explosion due to an accumulation of hydrogen after the condensers had been cleaned with acid. The exhaust end of the casing was fractured circumferentially and some pieces were too badly shattered to replace. The completed repair is shown in Fig. 6. It took three to four weeks, elapsed time, to put the turbine back in service. This is in contrast to the twelve to eighteen months it takes to get a new turbine casing.

This application is particularly interesting because new pieces had to be cast to replace the missing pieces and these were then inlayed with the original pieces to complete the repair. The repair had no difficulty passing underwriter's inspection. Similar repairs have been made on the high pressure end of steam turbines and large turboblower casings.

Spoke fracture was the trouble with the bull gear shown in Fig. 8. Originally it was sent to a maintenance shop for repair. Using conventional fusion methods and not making a thorough survey before attempting the repair resulted in a broken hub; distorted rim.

Line of Holes

Because the fracture was inaccessible for stitching, a line of closely spaced holes was drilled across the spoke. The fracture was then bronze welded. The subsequent shrinkage broke the spoke at the line of holes. This break was then repaired by stitching with no shrinkage problems. This is an example of what can happen when the wrong repair method is prescribed.

The crankshaft for a large power diesel shown in Fig. 7 was repaired twice. The first failure was repaired by welding. It was a good repair job but the shaft failed again shortly after it was reinstalled in the engine. The part of the survey that states that the cause of the failure should be determined had been overlooked. It turned out that the cause for both failures was simply misalignment of bearings. One bearing was 0.20 in. out. The subsequent stitched repair job was done at a fraction of the usual welding cost.

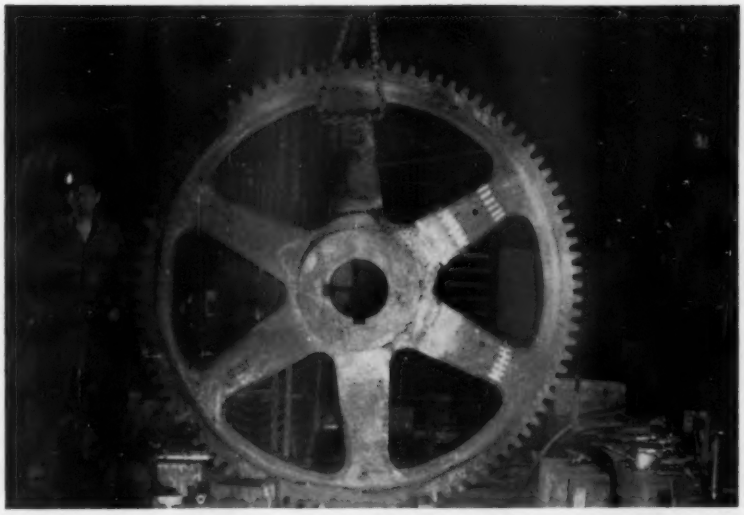
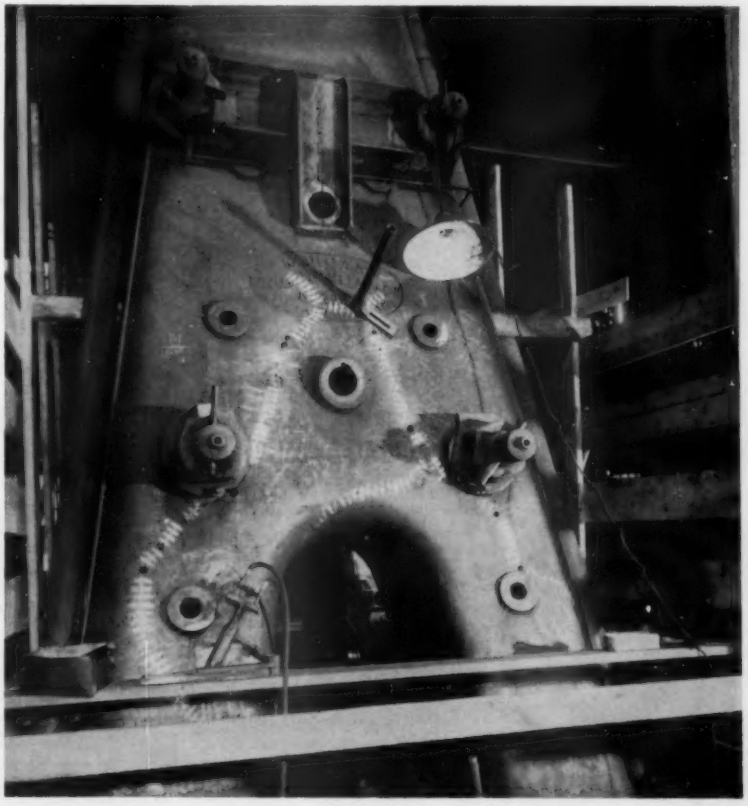


Fig. 8. Use of the metal stitching method put this big gear in working order

One more example indicates the degree of damage that can be repaired with metal sutures. The steam hammer frame in Fig. 9 had a complete failure of one leg with over sixty lineal feet of fracture throughout. It would have taken between six months and a year to get a new frame. Use of the method previously discussed permitted the completion of the job in a few days, and the hammer was restored to its original strength. As it happened, this steam hammer was an extremely vital item in the plant's production line so the time saved had premium value.

These examples indicate the repair potentials of cold metal stitching, which is one of few means applicable to cast iron that underwriters will allow. END

Fig. 9. Steam hammer frame repair took sixty lineal feet of metal stitches



Can Our Old Boilers Be Reactivated?

The Answer Was: "Yes" — Thanks to Ultrasonic Testing

Technician from Roberts & Randolph Ultrasonics Co. makes thickness tests of boilers to see if they can be reactivated

By F. G. FRYBERGER, Plant Engineer, Fine Chemicals Dept., Food Machinery and Chemical Corp., Baltimore, Md.

DUE TO the rapid expansion in the process facilities at the Fine Chemicals Department of Food Machinery and Chemical Corporation, it recently became necessary to increase the department's steam capacity.

Supplying the additional steam capacity seemed a simple matter provided we were able to reactivate two old boilers to supplement the capacity of two new package boilers.

The old boilers had been installed in 1917 and had been used only occasionally for a number of years prior to the recent acquisition of the plant. Because of the age of the boilers and their long periods of inactivity, careful examination was made by plant personnel, in collaboration with an experienced inspector of the Mutual Boiler and Machinery Insurance Co., to determine their condition.

After considering a number of testing techniques, it was agreed that we should determine the thickness of certain critical metal parts by the ultrasonic method.

The use of the ultrasonic method is based on the principle of resonance. High frequency sound, which is passed through the part to be tested, continues to echo from front to back to front. In doing so, it is either in or out of phase with new sound waves which are entering.

When the wavelength of the sound is adjusted so that the echo coincides with a correspondng portion of the entering waves, there is a reinforcing effect and a sudden rise of output from the instrument. This point represents a resonance condition and relates directly to the thickness of the wall. Conversion from wavelength to thickness is simple and accurate.

How Thickness Tests Were Conducted

To carry out thickness tests on our two boilers by the ultrasonic technique, we engaged the field testing service of the Roberts and Randolph Ultrasonics Co., Baltimore, Md. The method proved highly satisfactory to us. Both boilers were tested in a period of eight hours and found safe for operation at 150 psi.

The surfaces to be tested were prepared by wire brushing in most cases or by chipping where necessary. A small smear of grease was applied to the cleaned surface to assure intimate contact between the soundhead and the metal.

During testing, the soundhead was pressed lightly against the surface and held in position while a varying scale of frequencies were introduced. The operator, observing high points on an ammeter and peaks of sound by means of headphones, detected the resonance points which indicate wall thickness. These points were converted to thickness by means of a scale built into the instrument. The entire testing operation only requires several minutes per reading, provided spots to be tested have been cleaned previously.

Any accessible metal parts, including the boiler drums, can be tested by this method. Two tested locations are shown in the illustrations.

Upon completion of the tests, the readings, along with the conversion tables, were given directly to the insurance company for their review as one basis for approval or rejection of the boiler for use. These boilers are now in active use giving us the supplementary steam needed for our greatly expanded plant operations. END

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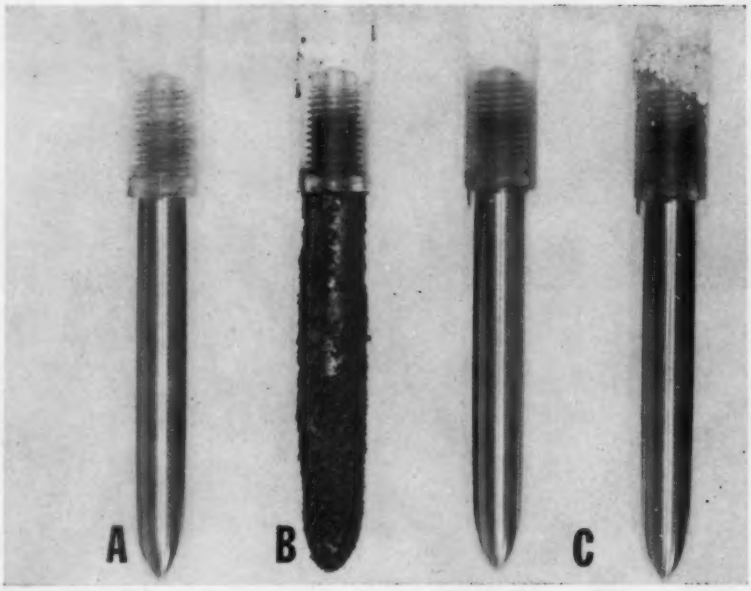


Test shows inhibiting action. A, unexposed; B, no inhibitor; C, inhibitor used

Fuel Oil Unstable?

Inhibitors Can Solve Storage Problems

By R. J. STEDMAN, Universal Oil Products Co.

ONE OF THE MOST exasperating of the difficulties experienced with No. 1 or No. 2 heating oil or Diesel fuel is that of the storage deterioration of distillate fuel oil blends. The problem revolves chiefly around the catalytically-cracked distillate oils which contain small amounts of easily-oxidized and otherwise active compounds that slowly react in the presence of air to form an insoluble material of variable composition. This material may cause operating problems in storage and burning equipment.

Formation of this insoluble gum is usually accompanied by a darkening in color of the oil—however, it is entirely symptomatic and does not, in itself, affect the quality of the oil or cause functional difficulties.

What Is a Stable Oil?

A stable oil is simply defined—it is one which has the storage properties of the average uncracked virgin distillate. The real question is, how much instability can be tolerated. Authoritative sources variously estimate the maximum permissible amount of filterable gum formation to be in the range of two to eight milligrams per liter per year.

Variables to be considered in controlling insoluble gum formation are these:

Blend composition. Most refiners find it expedient to sell a blend of cracked and straight-run oil to the No. 2 heating oil and Diesel fuel market. The quantity and basic composition of both the cracked and the straight-run oil used in the blend have a decisive effect on the storage stability of the oil.

Exposure to air. These deleterious reactions depend on the concentration of and time of contact with air.

Catalysts. Copper acts as a catalyst to promote the deleterious reactions. Other undesirable constituents in the oil include certain other metals, thiophenols and pyrroles.

Temperature. As in all chemical reactions the rate is dependent upon temperature. It generally is believed that temperatures above 90 F are necessary in the average case for appreciable deterioration rates.

Miscellaneous. The presence of such elements as moisture, hydrated iron rust, cresols, organic acids, entrained caustic and surface active materials may all affect the coagulation and filterability characteristics of colloidal gum.

It is well to note that the main difficulty arising from unstable oil lies in clogging of filters, screens and burner tips by precipitated gum. However, iron corrosion product also quite frequently combines with cresols, sulfur compounds and even water to form an inorganic filter-clogging material. Copper is likewise known to combine with sulfur compounds to form a gelatinous filter-clogging material.

With the above information well in mind it is possible for the consumer to pursue a course best designed to keep him out of difficulties with his fuel supply. For example he might:

Check storage times on all oil purchases so that it is used on a "first in-first out" basis.

Set up specifications so that all oil purchased has acceptable storage stability and rust-preventing characteristics.

One of the best forms of insurance against unstable or corrosive oil—insist that the oil contains:

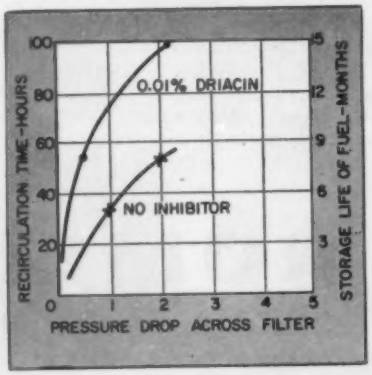
A sludge-dispersant to prevent filter clogging

A corrosion inhibitor

Copper Deactivator to pacify the ill effects of dissolved copper

Driacin, a product of Universal Oil Products Co., is both a powerful sludge dispersant and film-forming rust inhibitor. It eliminates inorganic sludge by preventing corrosion, and prevents the coagulation of colloidal organic sludge so that the particles never increase to a size large enough to clog a filter, screen or burner tip. About 0.01% of this inhibitor represents a typical dose. END

Graph of effect of inhibitor on reducing filterable sediment in a Diesel fuel



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XII. What About Spare Parts?

Here's What You Should Stock for Fluid Power Equipment

By H. L. STEWART and J. M. MORITZ, Logansport Machine Co., Inc.

WHAT SPARE PARTS should be kept on hand to keep fluid power equipment in operation? A breakdown without available repair parts presents a very serious situation not only from a loss of revenue due to downtime, but it also means a loss of wages to the employees and strained relations with the customer due to late deliveries.

The director of plant maintenance should consider several things when determining the amount of spare parts on fluid power equipment that he should have at his disposal.

1. How serious would a failure in a fluid power component effect the operation in the plant?
2. How long would it take to obtain repair parts?
3. What is the normal usage of repair parts?

There is always the question of how long it takes to obtain repair parts for fluid power components. This often dictates the amount of spare parts that should be kept on hand. For example, if the components of your fluid power system are manufacturer's standard catalog items, then it is quite likely that the manufacturer will have the items which make up each product in stock.

In cases where the components are special, it is quite a different story. The component is made up to meet your particular need and it is very unlikely that any spares will be carried in the manufacturer's stock. For the original component it may be necessary for him to order special packings which may necessitate a new mold on the part of the packing manufacturer.

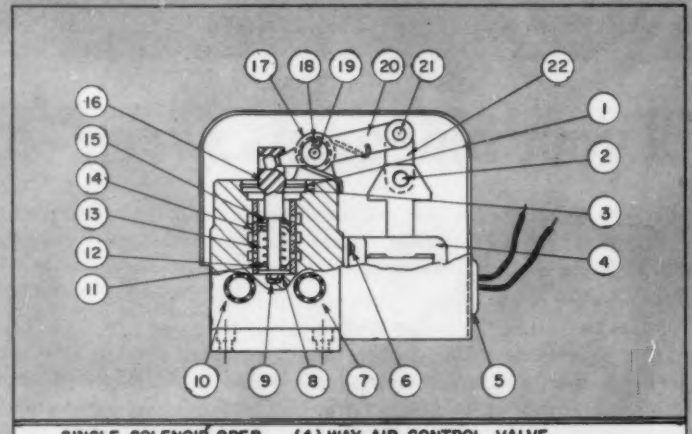
When repairs are needed, the manufacturer of the component will order from the packing manufacturer, who in turn, must work this order into his production schedule since he will not stock special packing. You can see that you might be held up on delivery for some time—often as much as six to eight weeks.

In the case of special components, if they are located on a critical operation, it may be wise not only to carry spares for the parts that are most likely to fail, but also a complete spare component may be most useful. Many large plants practice this procedure.

If you are located near your source of supply, it is often to your advantage since your supplier can reduce your needs for spare parts on standard components. With parcel service, spare parts can be in your plant in a matter of hours. Overnight service to more distant places can now be realized with air mail, air express and air freight.

Paper work in your plant may bog down and cause a delay in getting an order placed for spare parts. We often find that someone in the plant engineering group will call in and want to know where his repair parts are, yet we haven't even received the order even though he stated that he had requisitioned the parts several days before. In cases of emergency, keep after the purchasing department to get the order sent out. A call from your purchasing department to the supplier will certainly speed up the order.

If you are located in one of the larger cities, it is quite possible that you



SINGLE SOLENOID OPER., (4) WAY AIR CONTROL VALVE

KEY	NAME	KEY	NAME
1	RETAINING RING	13	CUP SPACER SPRING
2	SOLENOID PIN	14	VALVE LINER
3	STEM GUIDE	15	CUP FOLLOWER (UPPER)
4	SOLENOID	16	PISTON STEM
5	GROMMET	17	PISTON RETURN SPRING
6	SOLENOID SCREW	18	SET SCREW (LOCKING TYPE)
7	VALVE BODY	19	LEVER PIN
8	CUP FOLLOWER (LOWER)	20	VALVE LEVER
9	STOP NUT	21	LINK PIN
10	UNIT COVER SCREW (NOT SHOWN)	22	SOLENOID LINK
11	CUP PACKING		
12	CUP WASHER		

Fig. 1. The plant maintenance department should have a parts sheet on every fluid component in the plant. A sample parts sheet for a control valve is illustrated

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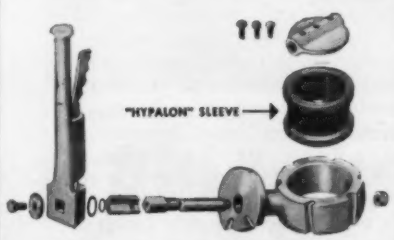
NEOPRENE pads replace steel springs as vibration isolators on conveyor system

Butterfly valves lined with HYPALON are adopted for waste-acid trucks

Industrial Wastes, Inc., of Beaver Falls, Pennsylvania, haul and neutralize spent acids from Pittsburgh Steel Mills. Each month their tank trucks handle 2½ million gallons of spent acid—mixtures of nitric, sulfuric, hydrochloric and hydrofluoric.

Three years ago the company tried a new kind of outlet valve for their trucks—a six-inch butterfly with a liner of HYPALON synthetic rubber. The valve weighs only 30 pounds, is self-cleaning.



Metal damper rotates in a ring-piece with a sleeve of HYPALON. Squeezed shut, the sleeve makes a pressure-tight seal. Opened, it returns to its original shape.

That original trial valve and liner are still in service after three years. The company is now equipping all their trucks with the new valve as fast as old-style valves wear out.

Previously, the best outlet valve Industrial Wastes could find was a high alloy type. It weighed 250 pounds, which made it cumbersome to install and required special supports to prevent stress fatigue of the neoprene-lined tank shell. These older valves cost about 40 per cent more than the valves lined with HYPALON and were subject to frequent clogging by sediment.

For Industrial Wastes, HYPALON has solved a valve problem. For you it could be hose, tank linings, gaskets, diaphragms or any other rubber product that requires exceptional resistance to strong oxidizing conditions. The coupon will bring you information on the outstanding properties of HYPALON.

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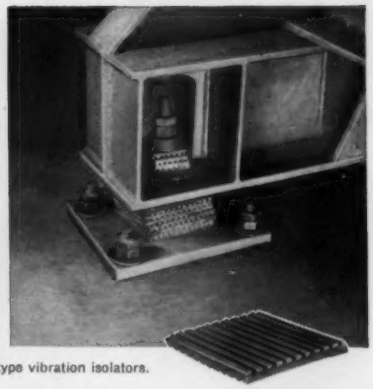

Neoprene pads are cheaper, easier to install than spring-type vibration isolators. Permit easy adjustment of stiffness or K factor.

Equipment manufacturer reduces inventory, simplifies fabrication

Carrier Conveyor Corporation, Louisville, Ky., recently designed a vibrating conveyor system for an eastern sugar company. The conveyor, used to carry refined sugar crystals from centrifugal filters to driers before final packaging, is mounted on neoprene isolation pads.

Previously, helical steel springs were used as mounts. Different operating conditions require springs of various stiffness and two sets of steel springs seldom have identical stiffness. With neoprene pads, it is possible to vary the stiffness or K factor by merely changing the size, making it unnecessary to keep a large inventory of isolation springs. Should adjustments be necessary, the pads can easily be resized at the job site.

Uncertain delivery of the springs made large inventories necessary. Now by keeping a relatively small stock of sheet neoprene, suitably ribbed for dampening vibration, pads can be built up in layers to obtain the stiffness requirement of each application. The neoprene mounts also simplify maintenance. Unlike springs, they don't require de-rusting or painting. Most important, the pads will last as long as the mechanical equipment, because of neoprene's time-proven resistance to aging, contact with oil and grease, and other deteriorating conditions.

This is only one example of the savings possible with neoprene because of its unique combination of properties. It is used advantageously in thousands of products throughout industry where resistance to chemicals, oils, heat, abrasion or weather is essential to trouble-free operation. For more information, just mail the coupon.

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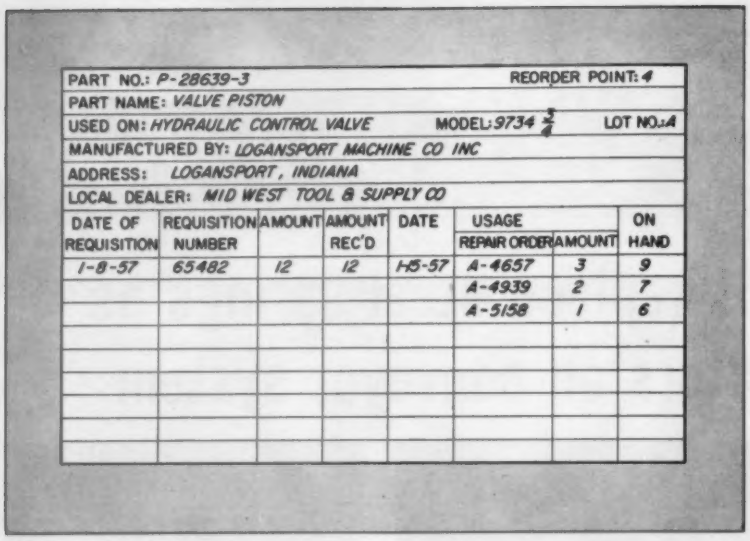


PART NO.: P-28639-3 REORDER POINT: 4
PART NAME: VALVE PISTON
USED ON: HYDRAULIC CONTROL VALVE MODEL: 9734 $\frac{5}{4}$ LOT NO.: A
MANUFACTURED BY: LOGANSPORT MACHINE CO INC
ADDRESS: LOGANSPORT, INDIANA
LOCAL DEALER: MID WEST TOOL & SUPPLY CO

DATE OF REQUISITION	REQUISITION NUMBER	AMOUNT	AMOUNT REC'D	DATE	USAGE REPAIR ORDER	USAGE AMOUNT	ON HAND
1-8-57	65482	12	12	1-15-57	A-4657	3	9
					A-4939	2	7
					A-5158	1	6

Fig. 2. Inventory on spare parts will be simplified by keeping a record of each part on a special form. One suggested form for such record-keeping is shown here

can obtain packings from a supply house. If so, make certain that they are suitable for the job. It is sometimes difficult to making a packing change, especially if the component is in an inaccessible location, so be sure that you haven't wasted your time by installing an inferior packing.

The usage of spare parts over a period of years may give one a basis for spare parts stock, but in so many instances new machines containing many fluid power components are being installed in plants already in existence and in new plants where they would have no basis for judging the need for spare parts. Here are some suggestions regarding the stocking of spare parts.

Have Spare Parts Sheets

First, the plant maintenance department should have a parts sheet on every fluid component in their possession. These should be obtained from the manufacturer of the components. These parts sheets are usually a cross section or an exploded view with each part designated with a name or number or both. Since manufacturers often make changes in their designs these parts lists should make reference to lot numbers.

Figure 1 illustrates a parts list on an air control valve. These parts lists should be marked by user, indicating on what machine the component is used. Before attempting to make any repairs the parts sheet should be studied carefully.

Where a complete machine is shipped into a plant, often the name tags and model tags are removed from the fluid power equipment. In such cases the builder of the machine should be requested to furnish a complete parts list on each fluid power component.

A constant inventory should be kept in the plant engineering office on spare parts for your fluid power components. Figure 2 shows a suggested form, but your local dealer may have suggestions that will better fit your individual needs. The form, however, should list the part number (yours), vendor's part number, part name, where used, model number, lot number, manufacturer's name and even the local distributor. The local distributor can be most helpful in obtaining spare parts. In cases of extreme emergency he may be able to borrow repair parts from another customer in the same city.

The card should always have a space marked "Reorder point" so that the clerk can quickly check the inventory record and can tell when it is time to write a requisition for repair parts. It may be necessary to change the "Reorder point" depending upon the vendor's deliveries.

It is suggested that you assign your own part numbers to each item inasmuch as one part, such as a packing, may be used on components made by several manufacturers and each of these manufacturers will have his own part-numbering system. Figure 2 shows how this can be set up so that there will be no confusion. Be sure to allow plenty of room for data on the components.

Place the spare parts for your fluid power components in a location that is only accessible to the personnel in charge of fluid power maintenance. This will reduce the loss of many small parts. Spare parts should be stored where it is dry, not too warm, and away from dirt and foreign matter. It is not uncommon to see a spare cylinder stored out in the open subjected to all kinds of weather.

One of the largest requirements in spare parts is packings. It is always well to have enough on hand to take care of any emergencies, but do not overstock on these items. Many packings will deteriorate with age and will be of no use when they are placed in a component. Some packings will become extremely hard when they become old and will not effect a seal. Others will become brittle.

Always keep packings away from heating pipes or other hot spots that will cause any drying effect. Keep packings in their original wrappings until it is time to use them. Always store packings in a neat and orderly fashion. Don't just throw them in a bin. It is advisable to tag each set or group of sets giving the part number and size so that it will not be necessary to unwrap them in order to check the size.

Too often when a person is in a hurry, he will open a set to measure them and if they are not the correct size for the job, he will hurry on to check another set and not re-wrap the first set, thus exposing them to the elements.

Storing Spare Parts

Packings should be stored by size and type. Keep "O"rings in one group, gaskets in another, packings in another, etc. Gaskets should be stored flat if possible. It is well to carry a couple of types of sheet gasket material on hand as there are many instances where such material can be used in repairing air and hydraulic devices. All other material that is usually a must in all fluid power maintenance stores is the rope-type packing, which can be used in emergencies to form different types of seals. This is usually heavily coated with graphite.

In stocking spare pistons for hydraulic control valves, one should consider several things. When ordering spare pistons make certain that you order them oversize on the diameter. The reason for this is that the valve body will wear more than the piston, and if you order standard size pistons, they will be of no use. Order them oversize, then when you are ready to make repairs, grind the piston to fit the valve body.

In storing hydraulic valve pistons, they should be coated with a good preservative and wrapped in an oiled paper. Be sure that they are protected

(Continued on page 268)

B.F.Goodrich

Skins become leather faster—because of Koroseal

PROCESSING of leather at the Allied Kid Company of Wilmington, Delaware requires a good deal of muriatic acid . . . and it's carried through B.F.Goodrich rigid Koroseal polyvinyl chloride pipe.

When other types of flexible and rigid piping were used, deposits built up within the bore and cut down acid flow. Weight, high cost, susceptibility to cuts and abrasions were other disadvantages.

Acting on the recommendation of chemical suppliers, Allied Kid installed Koroseal PVC pipe and find it has all the properties they seek.

Rigid Koroseal resists abrasions, has high impact resistance, is impervious to muriatic and other acids as well as alkalies, salts and oils. Koroseal is light and easy to handle, cuts installation and maintenance costs. Koroseal's mirror smooth bore does not permit build-up of deposits within the pipe.

If you need pipe in your plant, whatever the purpose, be sure to investigate Koroseal PVC. Koroseal installations have contributed to greater efficiency and more profitable operations in countless industries. Koroseal PVC also is available in sheet and rod form.

For more information send in the coupon on your right. *B.F.Goodrich Industrial Products Company, Marietta, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

B.F.Goodrich Industrial Products Co.
Dept. PE-9
Marietta, Ohio

Please send me free booklets on:

☐ Rigid Koroseal Pipe
☐ Rigid Koroseal Sheet

Name_____

Company_____

Address_____

City_____ Zone____ State_____

Koroseal—T. M. Reg. U. S. Pat. Off.

For more facts circle 564 on Reply Card

Car-Bottom Furnace Handles the Big Stress-Relieving Jobs

CARRYING A NOMINAL RATING of 100 tons, a gas-fired car-bottom furnace is being used to stress-relieve large castings at General Electric's Schenectady, N. Y., plant.

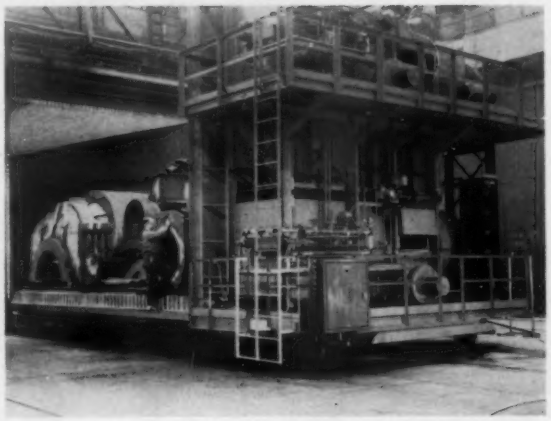
Maximum load dimensions are 30 ft in length, 18 ft in width, and 16 ft in height. The furnace has already processed loads of 150 tons, 50 per cent over nominal rating.

Total maximum heat input to the furnace is 10 million Btu per hour. Although the furnace is gas fired, the recirculating system is capable of being operated on fuel oil.

Fully automatic programming controls the heating cycles. The work is heated at the rate of 50 C per hour, held for a specified number of hours, and cooled at 50 C per hour.

The 100-ton car is driven by a five horsepower motor, through a fluid drive. The bulkhead type door can be driven solidly up against the face of the furnace, to provide an effective seal.

Each one of four independent heating systems consists of a 2.5 million Btu burner, a recirculating blower rated at 22,000 cfm, and an individual set of controls and combustion safeguards. One instrument panel contains all four



temperature control instruments, a program controller, recorder, and other indicators. Motor starters, including starters for blowers, damper motors, and car drive motor, are mounted in a control center near the instrument panel.

Trussless Construction Stretches Out— 150-Ft Roof Supports Itself

ANOTHER STEP has been made in the progress of trussless construction—a self-supporting unobstructed span of 150 ft has been developed by the Wonder Building Corporation of America, in Chicago. Its design eliminates the need for pillars, posts, purlins, trusses or supports of any kind.

The Truss-Skin roof system consists of specially fabricated 14-gage steel panels, secured by nuts and bolts to form self-supporting arches. Each panel of the arch segment is 2 ft wide and 10 ft long.

Cost of the 150-ft span was said to be one third less than similar roof structures, after a full-size model was erected and tested at the firm's plant. Pre-engineered fabrication of the building segments is expected to reduce erection time 35 per cent over conventional structures, according to the designers.

Tests on the structure show that the 150-ft roof will withstand hurricane-force winds in excess of 120 mph, and will support loads up to 32 lb per sq ft.

Cross-Country Ride in Dry Ice Keeps Aluminum Sheet "Soft"

REFRIGERATION has provided an ingenious solution to a perplexing metalworking problem, and has made a time and money saving contribution to the building of one of the nation's forthcoming jet airlines.

Aluminum skin for the wings of Douglas Aircraft Co.'s new DC-8 is cut from sheet rolled on the world's largest tapered sheet mill, located at the Davenport, Iowa works of Aluminum Company of America. The metal used is an age-hardening type of aluminum alloy specified by Douglas. At room temperature, sheet rolled from such an alloy slowly becomes harder and stronger. The advantage is that the sheet can be machined and fabricated while soft; it will then strengthen itself at room temperature without need for heat treatment or tempering.

One problem presented itself in the process of providing alloy to the West Coast plant—how to prevent aging of the tapered sheet during the week required to transport the material from Iowa to California for final machining.

Alcoa solved the problem by suspending the aging process with refrigeration. The aluminum sheet was packed in dry ice to provide a sub-zero cross-country ride. On

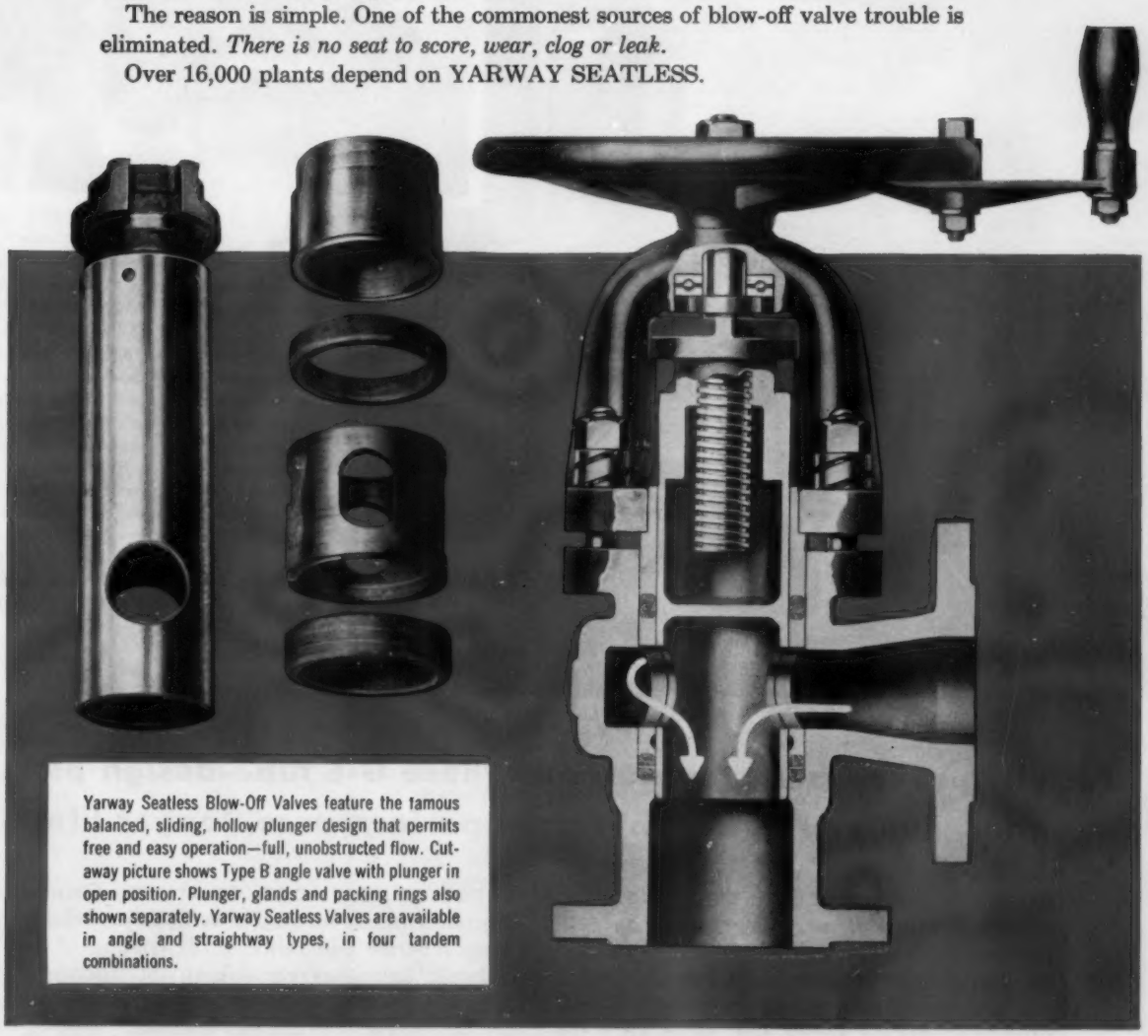
arrival, the sheet was taken out of the dry ice, cut to size and fabricated, then allowed its natural aging and strengthening process.

seatless
means savings

For nearly 50 years boiler plants in low and medium pressure ranges have been saving maintenance time and down-time thanks to dependable, trouble-free blow-down service from Yarway Seatless Blow-Off Valves.

The reason is simple. One of the commonest sources of blow-off valve trouble is eliminated. *There is no seat to score, wear, clog or leak.*

Over 16,000 plants depend on YARWAY SEATLESS.



Yarway Seatless Blow-Off Valves feature the famous balanced, sliding, hollow plunger design that permits free and easy operation—full, unobstructed flow. Cut-away picture shows Type B angle valve with plunger in open position. Plunger, glands and packing rings also shown separately. Yarway Seatless Valves are available in angle and straightway types, in four tandem combinations.

For information on Yarway Seatless Valves, sizes, materials, pressures, etc., write

YARNALL-WARING COMPANY 145 Mermaid Ave., Philadelphia 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES

YARWAY SEATLESS ...a good way to specify blow-off valves.

For more facts circle 565 on Reply Card

NOW...AUTOMATED TESTING OF

ABOVE: operator inserts a GL-6807 thyratron in rotating mechanism that carries all tubes automatically through an extensive series of performance checks.

LEFT: full-scale view of G.E.'s automated test equipment for thyratrons—the only one of its kind. Racked tubes ready for testing are at operator's right. Among the important checks that G-E thyratrons receive are tests for heater current; for peak anode voltage; peak cathode current; grid emission; and tube control characteristics. These and many other tests, automatically and infallibly applied to every tube, mean proved-in-advance performance for all General Electric thyratrons.

To fully proved performance, add these G-E tube-design plusses that give you better thyratron performance, longer life:

CONTROLLED MERCURY CONTENT. The closely controlled mercury content in G-E mercury-filled thyratrons means that (1) initial mercury distribution time is cut down, (2) tubes can be mounted with greater freedom. A special capsule is flashed inside G-E tubes after the latter have been exhausted, providing correct amount of mercury, with no excess.

NEW LONG-LIFE BASING COMPOUND. A new, superior epoxy-resin compound for bases and anode caps adds greatly to G-E thyratron life. This compound is "predictable" when applied—has a minimum tendency to weaken or deteriorate. Bases and anode caps stay in place.

SUPERIOR CATHODE COATING. General Electric's unique method of cathode processing gives superior adherence to the coating of the cathode; helps prevent flaking off. Increased tube life—better thyratron performance—both are direct results of the G-E method.

NEWEST TYPES AVAILABLE. New types—new improvements—constantly are being added to General Electric's line of thyratrons, long the industry's largest. Important recent new tubes are the GL-6807, 8, and 9 thyratrons for motor control, with external anode and grid cooling. First to develop and build thyratrons, General Electric continues to maintain design leadership.

GENERAL ELECTRIC THYRATRONS!

Performance of tubes is fully proved before you install them

Automated testing of G-E thyratrons—described at left—means proved-in-advance performance. This General Electric "first" solidly protects your tube investment. Your dollars buy pre-tested quality when you replace with General Electric thyratrons . . . and 46 types give full coverage of your factory requirements. Check the thyratron replacement list that follows; then phone your local G-E tube distributor for fast delivery service to your door! *Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Kentucky.*

Use this guide to fill ALL your replacement needs with G-E Quality Thyratrons:

G-E THYRATRON	WILL REPLACE:
2D21	WL-2D21 2D21, other makes WT-210-0001
GL-3C23	NL-3C23 WL-3C23 3C23, other makes CE-311
GL-5C21/C6J	C6J C6J/5C21
FG-27-A	
FG-81-A	WL-81-A
FG-97	
FG-98-A	FG-98-A, other makes
FG-105	WL-105 105, other makes AX-105/FG-105 WT-210-0079
FG-154	
FG-172	WL-172 172, other makes WT-T149 WT-210-0038 WT-210-0078
GL-393-A	NL-393-A WT-210-0067
GL-414	WL-414
502-A	WL-502-A 502-A, other makes
GL-627	KU-627 627, other makes
GL-672-A	WL-672-A 672-A, other makes 672
GL-678	WL-678 678, other makes
884	DR-884 RX-884 WL-884 884, other makes 6Q5-G WT-210-0003
885	RX-885 WL-885 885, other makes 284
2050	RK-2050 WL-2050 2050, other makes WL-630 WL-630-A WT-210-0004
GL-5528/C6L	C6L
GL-5544	5544, other makes
GL-5557/FG-17	WL-17 17 CE-309 NL-715 NL-715/5557 ML-728 UE-967 967 1701 5557 WL-5557/17 AX-5557/FG-17/1701 WT-210-0015 WT-210-0062 WT-210-0069
GL-5559/FG-57	AX-5559 5559 NL-5559/FG-57 WL-5559/57 WL-57 WL-631 WT-210-0056
GL-5560/FG-95	NL-5560/FG-95 5560 WL-632-B (certain design differences) WT-210-0057 WT-210-0116
GL-5632/C3J	C3J/5632 EL-C3J 5632 WT/210-0043 WT/210-0106
5662	
5663	
GL-5665/C16J	C16J/5665 EL-C16J 5665
5696	5696, other makes
GL-5720/FG-33	NL-5720/FG33 WL-33
5727	WT-210-0077
GL-5728/FG-67	5728/FG-67, other makes 1904
GL-5830/FG-41	WL-41 WT-210-0054
GL-5855	
GL-5948	5948, other makes 5948/1754 1754
GL-6011/710	WL-6011/710 GL-5632/C3J NL-710 NL-710/6011
GL-6014/C1K	6014 EL-C1K C1K/6014
GL-6044	
6525	
GL-6807	C6J-A/5685 EL-C6J EL-C6J/A EL-C6J/K NL-760 WT-210-0063 WL-5685/C6JA
GL-6808	EL-C6J/F EL-C6J/KF NL-760-P
GL-6809	EL-C6J/KL EL-C6J/L NL-760-L
GL-6855/716	NL-716
GL-6856/740	NL-740 WT-210-0017
GL-6857/740-P	NL-740-P
GL-6860/C6J/F	C6J/F

Progress Is Our Most Important Product

GENERAL ELECTRIC

161-1D3

For more facts circle 566 on Reply Card

Vapor Barrier, Non-Flammable Adhesive Protect Plant from Roof Fires

THIRTY-FOUR ACRES of fire-retardant roofing protect Chrysler Corp.'s giant new stamping plant in Twinsburg, Ohio. The roofing consists of flame-resistant Koroseal vapor barrier and non-flammable Lexsuco adhesive.

Installation of the roofing at the sprawling 1,400,000-sq ft Chrysler plant was completed by a 60-man crew in less than six months. The complete roof consists of a Walcon steel roof deck, Lexsuco fire-retardant roof construction, Fesco board roof insulation and a Koppers four-ply tar and gravel built-up roof.

The construction method eliminates flammable asphaltic materials from between the roof deck and insulation. Fire tests have proved that asphaltic materials used between a metal roof deck and insulation let go combustible gases that are forced down under pressure through the roof where they ignite and spread fire.

Koroseal vapor barrier also protects the insulated built-up roof from damage of moisture migration. Without the vapor barrier, water vapors, prompted by the temperature differential between warm inside and colder outside temperatures, can penetrate the insulated built-up roof layers.

Engineered and distributed by Lexsuco, Inc., the fire-retardant materials are manufactured by B. F. Goodrich Industrial Products Co.

Shop-Built Wind Tunnel Tests Air Flow Over Buildings

CONSTRUCTED BY research engineers of the Metalbestos Div., William Wallace Co., a specially-designed wind tunnel will be used for controlled study of vent top operation and air flow over residential and commercial rooftops.

When placed in operation later this year, the tunnel is expected to produce a wind velocity of over 60 mph. It is powered by a 100-hp automotive engine, using a pulley drive to turn a 5½-ft airplane propeller. The entrance nozzle is designed to provide uniform air flow across a 5-ft square test section in the central test chamber.

Completely enclosed, the test chamber will allow full-scale testing of vent tops in controlled velocities and pressures up to the maximum wind velocities and pressures to which vent tops are normally subjected.

The same test chamber will be used to study air flow over model buildings to locate pressure areas. This data will be used to determine optimum placement of vent tops on roof surfaces.

First tests of the wind tunnel will be for establishing internal flow patterns and calibration of instruments.

Air-Cooled, Roof-Mounted Condenser Gulps Exhaust Steam, Saves Money

A FLUID COOLER, largest of its type ever manufactured by the Trane Co., La Crosse, Wisconsin, is helping reduce aircraft plant operating costs for North American Aviation, Inc., at their Columbus, Ohio Navy jet plane plant.

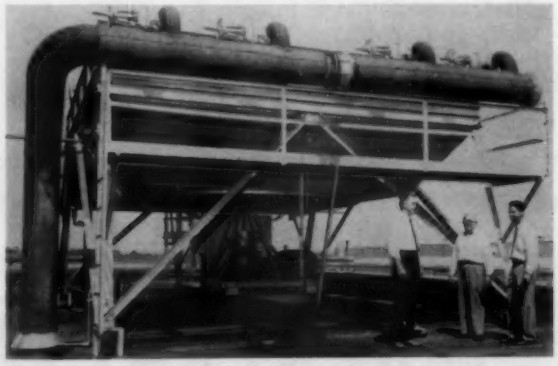
Installed on the powerhouse roof, the unit measures 30 ft in length, 20 ft in width and is 11½ ft high. It conserves water treating chemicals which are required for large amounts of makeup water.

Before the cooler was installed, exhaust steam from stream-driven air compressors was escaping, going up the powerhouse stack.

F. D. Moorhead, a mechanical installations group leader at North American, devised the fluid cooler steam condensing system, in cooperation with the engineering firm of Ralph & Curry, of Columbus. The cooler system returns the condensate for reuse through the boilers, condensing 30,000 lb of waste process steam per hour,—a gain of 60 gpm of condensate water.

The dry condenser, using air as its cooling medium, has none of the problems associated with cooling water, such as corrosion and scaling.

As the load and outside air temperature vary, automatically-controlled shutters modulate the condenser's capacity and reduce fan-motor horsepower. The owner estimates that the unit will pay for itself in less than 18 months, through chemical and makeup water heat savings.

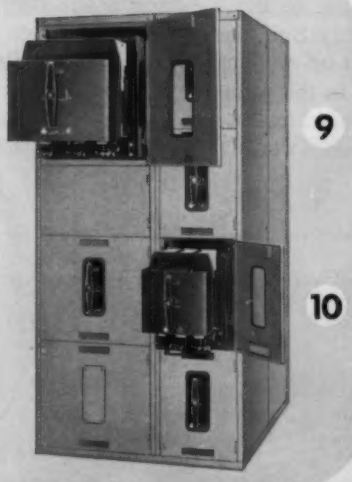


MATCHED INSTALLATIONS WITH SQUARE D *POWER-STYLE* LOW VOLTAGE SWITCHGEAR!

Control Centers, Unit Substations or Switchboards—
They All Match! They're POWER-STYLE Construction, Too!

DESIGN LEADERSHIP FEATURES

1. New design Type LA circuit breakers with T type handle for easier manual operation
2. Hinged doors provide ready access to circuit breakers
3. Fully equipped compartment for future breaker
4. Four 225 ampere LA-15 or 600 ampere LA-25 circuit breakers can be mounted in an 18″ wide vertical section
5. Three 1600 ampere LA-50 circuit breakers can be mounted in one 26″ wide vertical section. Wider sections are available for higher capacity breakers—34″ for 3000 ampere and 40″ for 4000 ampere
6. Enclosure is 91-½″ high and 54″ deep. Durable, baked enamel blue-gray finish over rust-inhibiting primer
7. Instruments and meters on hinged door of isolated compartment



8. Circuit breakers are mounted on positive pantograph drawout mechanism which holds breaker in *connected, test, disconnected,* or *fully projected* position
9. Bussing is silver plated and braced for 50,000 ampere minimum. Arranged to provide adequate space for cables
10. Pantograph drawout mechanism projects breaker beyond front of switchgear—permits easy inspection of disconnect contacts without breaker removal. When desired, breaker can easily be lifted from pantograph mechanism

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

For more facts circle 567 on Reply Card

Air Conditioning Control at

CONVAIR–HOME OF THE

Johnson Pneumatic Control System Solves the Varied Temperature Regulation Problems of One of the World's Largest Air Conditioned Industrial Plants

Convair's impressive record in aircraft production was highlighted recently by the design, development and, now, the production, for the United States Air Force, of the nation's first supersonic bomber, the Convair B-58 "Hustler".

PROBLEMS ARE COMPLEX

Accurate control of thermal conditions for this and other vital work is provided by a Johnson Pneumatic Temperature Control System. The multi-building Convair-Fort Worth plant, one of the world's largest, poses a variety of intricate temperature regulation problems due to its enormous size, diversified usage requirements, the types and number of systems controlled and wide load variations within, as well as among the various buildings.

USE REMOTE RESET

Largest of the buildings is the 4,000-foot-long Assembly Building which is air conditioned by large built-up systems using hot and chilled water. Control in the windowless structure is accomplished by Johnson remote readjustable thermostats in the spaces operating face and bypass dampers, outdoor and return air dampers and water valves on the coils. Six 1,000-ton refrigeration machines are installed for this one building alone.

A key feature of the pneumatic control system is a central control panel which greatly simplifies the control work and provides the flexibility needed to heat, cool and ventilate the buildings efficiently.

PNEUMATIC OFFERS ADVANTAGES

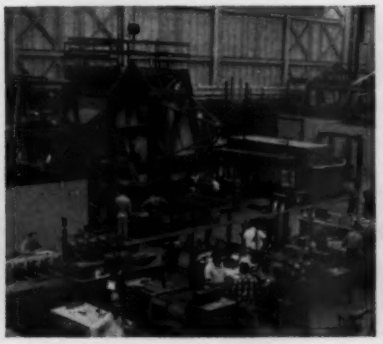
Countless leading industrial buildings, of all types and sizes, are equipped with Johnson Pneumatic Control Systems. Whether your particular problems involve comfort conditions or protective temperatures and humidities for products and processes, pneumatic control meets every requirement. It's simpler by far than any other method of control —requires fewer components, is easier to operate and maintain, offers the widest choice of operating features.

A nearby Johnson engineer will gladly explain how these advantages can be applied to your problems. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

Convair Division, General Dynamics Corporation, Fort Worth, Texas. Besides the huge Main Assembly Building, other buildings with Johnson Pneumatic Control include the Development, Radar, Experimental and Flight Test Buildings and Test Laboratories A and B.

. . . Engineering

. . . Testing



. . . Assembly

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

For more facts circle 568 on Reply Card

NEW PLANT CONSTRUCTION — advance information on location, costs

Foreman, Ark.—Arkansas-Louisiana Gas Co., Shreveport, La., plans to construct a new cement plant. Work on the preliminary construction is already under way and plant is expected to be in operation by late 1958. Cost of facility reported to be about $15 million.

Pine Bluff, Ark.—General Chemical Division, Allied Chemical & Dye Works, 40 Rector St., New York, N. Y., plans to construct a new plant for the production of aluminum sulfate to supply paper mills in the rapidly expanding paper center here.

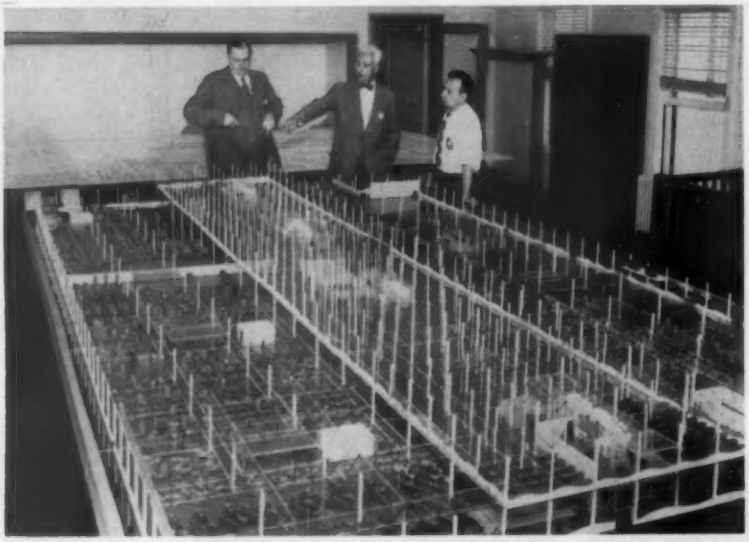
Compton, Calif.—Westinghouse Electric Corp., Pittsburgh 30, Pa., plans to construct an ultra-modern manufacturing and repair plant on S. Santa Fe Ave., in the Rancho San Pedro industrial area of Compton. Plant, scheduled for completion by early 1958, will provide 80,000 sq ft of plant space and approximately 8,000 sq ft of office area. Plant when completed will represent an investment of about $1-million.

Fontana, Calif.—Kaiser Steel Corp., 1924 Broadway, Oakland, Calif., has announced completion of expansion arrangements at company's Fontana Works. Expansion is expected to double plant's capacity from 1.5 million ingot tons to more than three million ingot tons when completed late next year.

Wilmington, Del.—E. I. du Pont de Nemours & Co., Inc., Du Pont Bldg., will build a wing-addition to company's Chestnut Run Laboratories near here. Construction of the new addition will begin at once with completion scheduled for mid-1958. The 11,000-sq ft wing will house 56 single offices to be used by company's polychemicals department for work on plastics, processing and design techniques. Cost of new wing will be approximately $700,000.

Marion, Ill.—Olin Mathieson Chemical Corp., 460 Park Ave., New York, N. Y., plans major expansion of company facilities for development and production of high energy solid fuels for rocket engines.

Charles City, Iowa—Oliver Corp., 400 W. Madison St., Chicago, Ill., has announced plans for the expansion and modernization of plant facilities for the manufacture of wheel tractors at local plant here. The work, which will include the construction of a new building, is slated for completion by early next year at a reported cost of approximately $500,000.



This three-dimensional scale model of the new Hamilton Standard plant at Windsor Locks, Conn., has been the focal point of many conferences on the movement of machinery to the new plant which will be devoted to jet engine fuel controls

Lawrence, Kan.—Callery Chemical Co., Callery, Pa., has authorized construction of a $4-million plant for the production of boron specialty chemicals for commercial use as well as high energy fuel for jet aircraft and missiles. Ground has already been broken for new facility scheduled to go into operation by late 1958.

Jackson, Miss.—Jackson Ready-Mix Co. and Associates, plans to construct a new $1-million plant for the manufacture of lightweight aggregates. Company plans to mine clay from the tract from which aggregate will be made and treated in large gas-fired kilns.

Murray Hill, N. J.—Air Reduction Co., 150 E. 42nd St., New York 17, N. Y., has authorized construction of a two-story polymer plastics laboratory building, adjacent to company's research center. Laboratory scheduled to be completed by early 1958, will be devoted primarily to the production of polymers for paints, adhesives, plastics and coatings. Building and facilities when completed will represent an investment approximating $500,000.

Princeton, N. J.—Western Electric Co., 195 Broadway, New York, N. Y., plans to construct an engineering laboratory in Hopewell Township, near here. Laboratory will be devoted to basic studies and development work in various engineering fields. A 200-acre site has been acquired for the building and work is planned to begin soon. When completed, project will represent an investment of $1.5 million.

Wayne, N. J.—Manhattan Shirt Co., 414 Madison Ave., New York, N. Y., has purchased a 24-acre building site here on which company proposes to construct a new manufacturing plant to cost about $2.5 million. Proposed 235,000-sq ft plant will include a warehouse distribution center and 35,000-sq ft of air-conditioned office space.

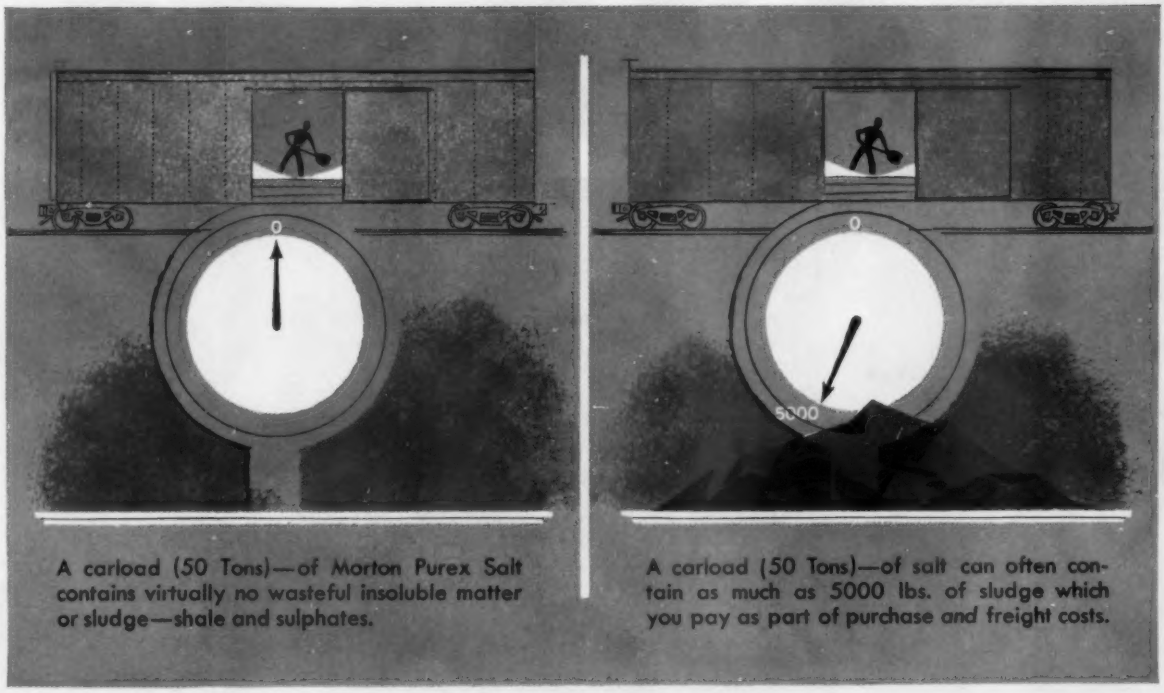
Niagara Falls, N. Y.—Carborundum Co., has announced plans for a $3.2-million expansion program at three of its plants —two in this country and one in Shawinigan Falls, Canada. Bulk of the expansion program will go toward improving company's Canadian plant and Vancouver, Wash., facility to take advantage of the future power expectancy in the area. Program also calls for limited expansion at Niagara Falls, N. Y. works.

Enka, N. C.—American Enka Corp., has authorized a major expansion of its nylon facilities here at a reported cost in excess of $5 million. Construction of a large addition to present nylon plant will get under way at once and will be in operation in 1958.

Farmville, N. C.—American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., has broken ground for a multi-million dollar fibreboard plant to be erected on a 97.5-acre tract of land recently acquired. New plant will have an initial annual capacity of 40-million sq ft of ¾ in. board used as an underlayment for laminated materials. Work on the site and buildings will begin immediately for completion in early 1959.

Winston-Salem, N. C.— R. J. Reynolds Tobacco Co., plans a major ex-

(Continued on page 263)

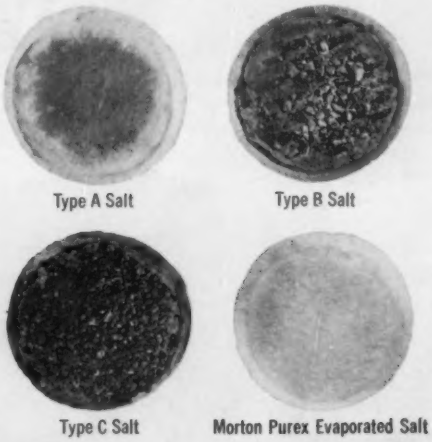


A carload (50 Tons)—of Morton Purex Salt contains virtually no wasteful insoluble matter or sludge—shale and sulphates.

A carload (50 Tons)—of salt can often contain as much as 5000 lbs. of sludge which you pay as part of purchase and freight costs.

Stop paying for wasteful sludge —switch to Purex Salt

These filter pads (approximately 1/5 actual size) show you how much insoluble matter (sludge) you get in just 5 lbs. of various kinds of salt.



Type A Salt

Type B Salt

Type C Salt

Morton Purex Evaporated Salt

Tests for insolubles taken from random samples show you that Morton Purex is the only one that contains no wasteful sludge or insolubles.

For more information about Morton Purex Salt, and for free, expert help on any water-softening problem, write:

When you buy Morton Purex Salt, you get high purity evaporated salt that is made in a controlled-particle size to prevent packing and channeling. With Purex, none of your purchase price or freight bill goes toward paying for useless, troublesome insoluble matter.

With Morton Purex, no time or labor is wasted in cleaning out insoluble matter from your brine making system to keep it functioning at peak capacity. For Purex is 100% soluble. Morton Purex will leave no accumulation of material in either brine or water softener tanks. It can be used in wet-storage systems, and in the Morton Model-E Brinemaker.

MORTON SALT COMPANY

INDUSTRIAL DIVISION

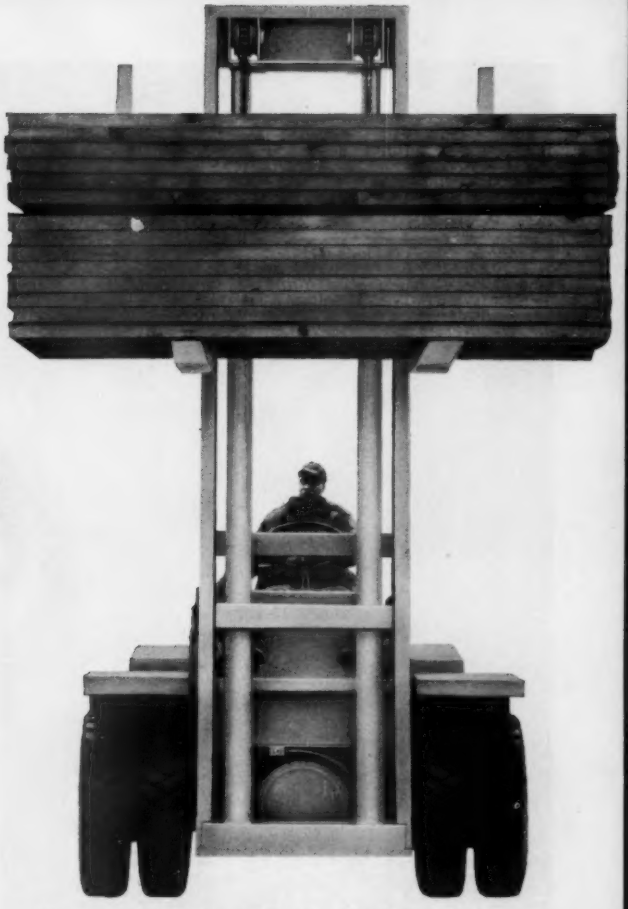
Dept. PE-9 120 So. LaSalle Street, Chicago 3, Illinois

NEW YALE G-3

CAPACITIES: 15,000—20,000 LBS.

SERIES

the only high-capacity gas trucks with all three features you need for fast, safe handling of BIG LOADS



300% MORE VISIBILITY. "Wide-Angle Vision"—a Yale exclusive! Upright channels are wide-spaced and nested. Hoisting cylinders and lifting chains are right next to channels to reduce frontal obstruction. Fork carriage has only one top, one bottom bar for extra forward visibility at all levels of fork lift. Unique open front design plus high center position of driver provide a wide arc of vision—maximum visibility forward *and* to the rear for fast, safe handling of heavy loads.

GREATER STABILITY. You get maximum stability under capacity-load conditions—even over soft or bumpy terrain. Center of gravity is low. Underclearance is high. Large, high-flotation tires give plenty of traction. Articulated steering axle, rugged wide-spaced upright design, side-thrust rollers keep loads steady at all points of lift, minimize weaving.

EXTRA MANEUVERABILITY. Short overall length plus 75-degree steer-wheel angularity mean extra-tight turning radius —high maneuverability. Power steering helps driver to move in and out of tight areas fast. For fast cycle operations, these new Yale trucks feature lifting speeds up to 60 feet per minute... fast, controlled lowering...travel speeds up to 20 MPH.

New G-3 Series Gas Trucks Have Famous Yale Quality—Premium Engineering Features Included as Standard:

- **For extra strength:** All welded steel frame. H-beam members in frame. Rugged channel construction.
- **For driving comfort:** Hoist, tilt, attachment and gearshift controls are grouped for easy-reach, right-hand operation. Directional control on steering column.
- **For maximum safety:** Power brakes. Anti-cavitation valve in tilt cylinders prevents hydraulic voids, stabilizes channels.
- **For easy maintenance:** Hinged hood and removable covers give easy access to engine and all other operating units.
- **For smooth lifting action:** Channels and carriage are mounted on roller bearings with side-thrust rollers. Lifting cylinders are ball mounted.
- **Your choice of Fluid Coupling or standard transmission.** Gasoline or LP-Gas powered models. Wide range of attachments—all engineered for a minimum loss distance.

YALE*

*REG. U. S. PAT. OFF.

INDUSTRIAL LIFT TRUCKS AND HOISTS

The Yale & Towne Mfg. Co., Yale Materials Handling Division
Manufacturing Plants in Philadelphia, Pa., and San Leandro, Calif.

Gasoline, Electric & LP-Gas Industrial Lift Trucks • Worksavers Warehousers • Hand Trucks • Hand and Electric Hoists

For more facts circle 570 on Reply Card

The YALE & TOWNE Manufacturing Co.
Dept. A-479, Roosevelt Boulevard, Philadelphia 15, Pa.

Please send me the new Yale High-Capacity Gas Truck brochure No. 5230A.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

FORD ASSEMBLY PLANT
San Jose, California

Plant saves on 45 acres of overhead work with

UP-RIGHT
aluminum
SCAFFOLD-ON-WHEELS

17 FT. SCAFFOLD ASSEMBLED
IN 2 MINUTES BY 2 MEN

Faster, better, safer
work from
large enclosed area

WRITE FOR
CIRCULAR

You, too, can save with these rapidly assembled Up-Right aluminum scaffolds
Up-Right Scaffolds • Dept. 163 • 1013 Pardee St., Berkeley, Calif.

For more facts circle 733 on Reply Card

2 NEW BLACKHAWK
hydraulic tool lines offer
unmatched
VERSATILITY
in solving maintenance problems

Now you can cut machine downtime and reduce maintenance costs *as never before* by using New Blackhawk multi-purpose hydraulic tools.

Choose whatever your plant needs from a complete family of HOLL-O-RAMS, Push-Pullers and Grip-Pullers — all with job-matched accessories — and enjoy undreamed of ease, speed and safety on hundreds of applications in maintenance, production, construction — in all industry!

NEW Amazing HOLL-O-RAMS

1. Self-retracting HOLL-O-RAMS are extra-compact — *No exposed springs*, yokes or external interferences.
2. Versatility *tremendously* increased with three interchangeable saddles.
3. One ram serves as power unit for pullers, for lifting as a jack. *No other ram* fulfills this multiple purpose.
4. Rams are provided with a means to mount conveniently in presses, jigs and fixtures.
5. Rams are machined from solid steel bars — not castings. Greater strength, safety, freedom from porosity and leaks. *Full power output* in a single symmetrical unit!

. . . and there's plenty more!

NEW 3 complete series of BLACKHAWK HYDRAULIC PULLERS

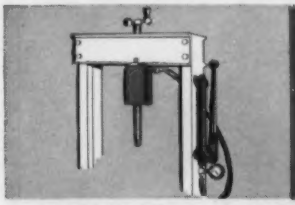
Push-Pullers, Double-Grip Pullers and Triple-Grip Pullers — activated by 20, 30 and 60-ton HOLL-O-RAMS! A maintenance man's dream!

Push-Pullers in 3 capacities.

Double-Grip Pullers in 3 capacities.

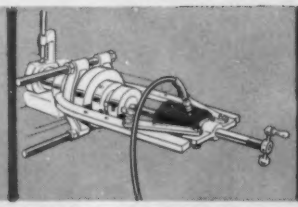
Triple-Grip Pullers in 3 capacities.

Here's where you use these new lines!



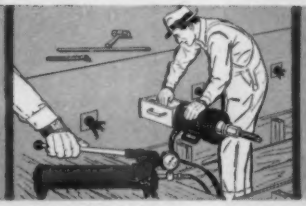
PRODUCTION

Blackhawk HOLL-O-RAMS power presses build into production fixtures for assembling, pushing, pulling, bending, clamping, spreading. Use them with gauge-equipped pump for a wide range of testing operations.



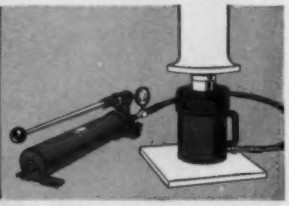
MAINTENANCE

Blackhawk hydraulic pullers provide an easy, damage-free method for torque-free removing or installing of gears, pulleys, wheels, bearings — any shaft-driven part press-fit on tube or shaft.



CONSTRUCTION

Blackhawk HOLL-O-RAMS fulfill a growing need for pre-stressing concrete, stressing cable, post-tensioning and pulling shafts on construction jobs. Speed equipment repairs right on the job!



ALL INDUSTRY

Blackhawk HOLL-O-RAM with pump and hose converts to a versatile, remote-control hydraulic jack. Exerts full power in any direction, any angle. Tremendous power at your fingertips for lifting on 1001 jobs.

BLACKHAWK®

BLACKHAWK MFG. CO., Dept. H-4997, Milwaukee 46, Wis.

"World's Largest Manufacturer of HYDRAULIC POWER TOOLS"

Phone your industrial supply man right now! He'll give you quick facts on HOLL-O-RAMS and HYDRAULIC PULLERS . . . leave you a complete Blackhawk catalog No. HP-400.

For more facts circle 571 on Reply Card

Only New HALLOWELL *ERECTOMATIC.* Steel Shelving

LESS TIME, MORE UNITS PER HOUR, lower costs with Hallowell ERECTOMATIC steel shelving. Maximum adaptability to meet changing conditions, too.

No matter what type of shelving you need—open, closed, bin units, ledge units, counter or cabinets —there's new Hallowell ERECTOMATIC® steel shelving to make your job easy. The unique built-in locking device* speeds assembly and rearrangement of shelving. To position a shelf—just slide it into place on the shelf supports, press the locks, and the shelf is locked. To reposition a shelf—release the locks, pull the shelf straight out, slide it straight in on its supports at the new location, and press the locks. It takes only seconds to do the complete job.

For complete information, see your Hallowell distributor. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.

*Patent applied for

TWO MEN ASSEMBLED new Hallowell ERECTOMATIC steel shelving in just over 10 minutes. Closed unit was 36 in. wide, 18 in. deep, 7 ft. 3 in. high, complete with seven shelves. Standard models of other design required from 13-55 min. Table shows test results.

Brand	Time to Assemble (Min.)	Units Per Hour
Erectomatic	10.24	5.75
A	13.23	4.53
B	14.24	4.21
C	16.30	3.68
D	18.12	3.31
E	25.03	2.40
F	55.03	1.09

FAST ASSEMBLY. Just position the shelf supports, insert the shelf, and press the unique locking device. No tools or special instructions necessary.

gives you all these extra-value features

QUICK SHELF CHANGE. Just release the locks, remove the shelf and its supports, relocate the shelf, and press the locks. It takes only seconds.

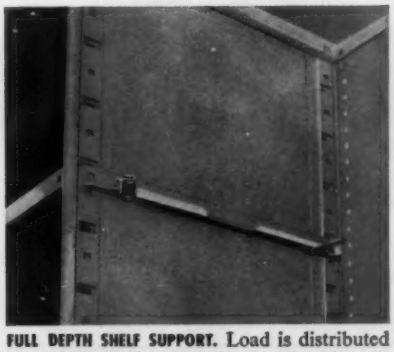
STRAIGHT-IN, STRAIGHT-OUT SHELF CHANGE. No tilting to interfere with any other shelf. No time wasted unloading shelves or removing bin fronts, partial dividers, label holders.

INDEPENDENT SHELF POSITIONING. Each shelf is an independent unit. Can be removed and repositioned without disturbing any other part. All shelves in a rack can be aligned.

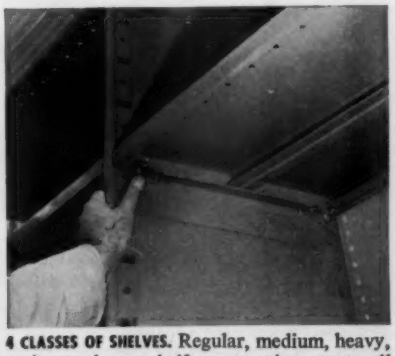
FULL USE OF SHELF AREA. No angles or tees, and beaded corner posts prevent waste of valuable storage space. No box guides are needed.

COMMON SIDE PANELS AND POSTS save assembly time. Also save material between adjacent units in a rack. And both back and side panels are one-piece.

BEADED POSTS AND FLANGED SHELVES prevent snagging of clothing or stored goods. Also prevent injuries from sharp, ragged edges.



FULL DEPTH SHELF SUPPORT. Load is distributed over full depth of shelf. No buckling is possible. Reinforcements can be added when they are required.



4 CLASSES OF SHELVES. Regular, medium, heavy, and extra-heavy shelf construction meets all load requirements. Made to government specifications. Extra-heavy shelf shown.

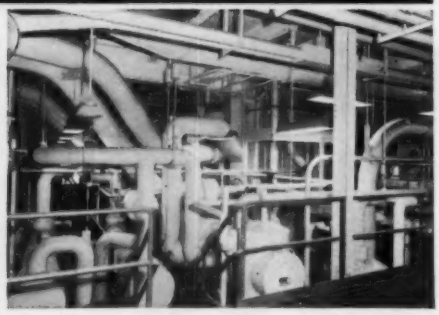
STANDARD PRESSED STEEL CO.

HALLOWELL® **SHOP EQUIPMENT DIVISION** **SPS**

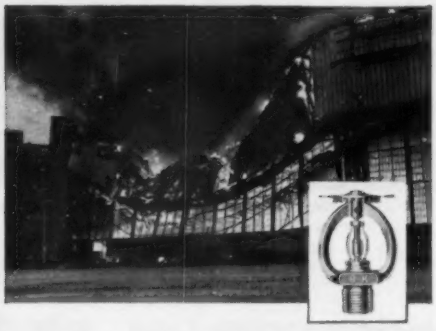
JENKINTOWN PENNSYLVANIA

For more facts circle 572 on Reply Card

BLAW-KNOX has what it takes—to provide these products and services



Heater piping system in this modern generating station is typical of many high temperature, high pressure systems prefabricated and erected by Blaw-Knox. Experienced piping engineers, modern shop facilities and a new Blaw-Knox digital computer method for fast, accurate calculation of piping stresses are available to you. Let us know your requirements and we'll provide the service you need. For more information, write for Bulletin No. 2443—"Piping for Industry."



Out of every 100 firms who lose their records in a fire, 43 never reopen for business. Be safe. Let a Blaw-Knox fire-protection engineer study your needs—and explain how you can pay for the system on our lease or deferred payment plan. To get more information send for Bulletin No. 2426—"Fire Can Destroy Your Business."

Blaw-Knox trapeze functional spring hanger installed in first large atomic generating station. Vital power piping system for the atomic generating unit in the Duquesne Light Company's Shippingport Station is supported by Blaw-Knox custom-engineered hangers.

Blaw-Knox makes a complete line of standard and custom-engineered pipe hangers, supports, and vibration eliminators. Each is a complete packaged unit, designed for a specific purpose and constructed to comply with the "code for pressure piping." Available in types and sizes to meet varying conditions, ready to install.

Blaw-Knox engineers, who have solved many difficult hanger and piping vibration problems, are always available to both design and make recommendations for your hanger requirements. For further information, write for Catalog No. 54.

BLAW-KNOX

BLAW-KNOX COMPANY

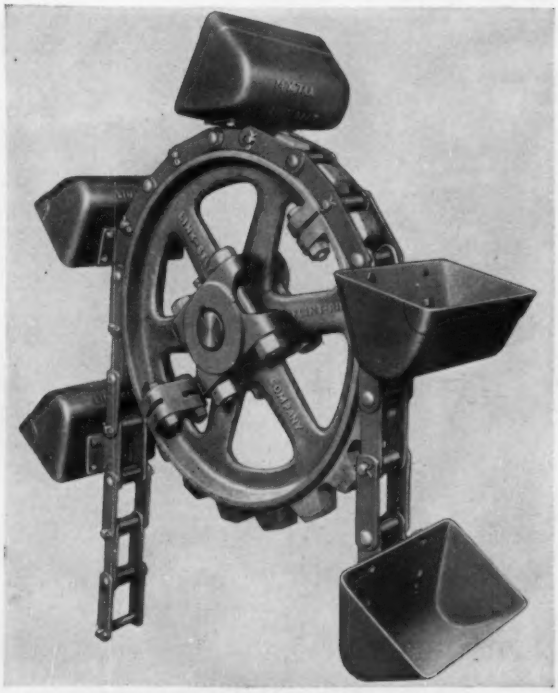
Power Piping and Sprinkler Division

829 Beaver Avenue • Pittsburgh 33, Pennsylvania

Complete facilities for prefabrication and erection of piping systems for all pressures and temperatures
...complete line of standard and custom-engineered pipe hangers, supports and vibration eliminators
...complete line of automatic sprinkler systems for standard and special hazards

For more facts circle 573 on Reply Card

Link-Belt SS Class bushed chain outlives previous chain 4 times



LONG, TROUBLE-FREE SERVICE of SS-111 chain (above) proves that it pays to select the right chain for a specific job from Link-Belt's complete line. It also proves that there's no need to pay a premium for costly special alloy steel chains.

Outstanding record established in severe, abrasive elevator service

This remarkable service record set by a Link-Belt SS-111 bushed chain (left) proves that often there's no need to go to excessively costly special alloy cast chains to get long life. Used at an Indianapolis (Ind.) fertilizer plant, this chain handled an average of 75,000 to 80,000 tons of fertilizer before requiring replacement. The previous type of chain handled only 18,000 tons and required four times as much maintenance.

Designed for abrasive jobs

Link-Belt SS-111 bushed chain offers large joint bearing surfaces for greater wear resistance and trouble-free service in heavy-duty conveying and elevating. Sidebars of selected bar steel are accurately formed and machined for tight press fit of pins and bushings. The latter are made from tough, hardened steel and locked against rotation in sidebars.

These straight steel sidebars with hardened steel pins and bushings provide needed strength to prevent distortion under continuous heavy loads. Smooth, tough surfaces repel gritty materials, prevent packing in critical joints, resist abrasion and corrosion.

Many sizes of these heavy-duty chains are interchangeable with Link-Belt combination chains. And a wide range of attachments makes them adaptable to specific conveying and elevating requirements.

18 million tons, 26 years later... SS-856 chain still serviceable

Sets record in cement mill elevator service

The more than quarter-century of continuous handling of raw materials at a Pennsylvania cement mill illustrates the long-wearing durability of Link-Belt SS-856 elevator chain. This amazing service record under extremely tough conditions proves that it pays to pick the right chain from Link-Belt's complete line.

Link-Belt SS-856 chain is made of high carbon steel sidebars with nickel alloy pins and bushings. Hardened sidebars give additional strength plus greater resistance to wear and pitch hole distortion. In addition, accurately machined pitch holes assure proper pitch and tight press fit of mating parts —extend chain life. The hard, smooth surfaces of steel joints repel gritty materials . . . resist abrasion.

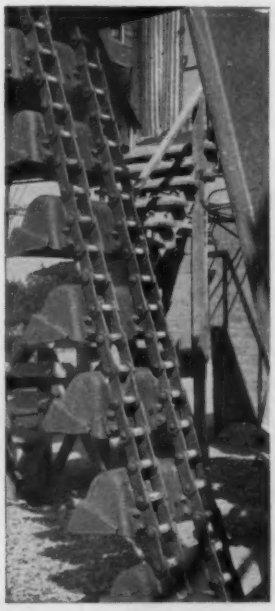
Link-Belt elevator chains are available with ultimate strengths up to 200,000 lbs.

Link-Belt SS-102½ bushed chain extends life of stone elevator

Several years ago an eastern stone quarry installed a main bucket elevator to handle 200 tons per hour of minus 2¼-in. mixed stone. Service life of the original two-strand elevator chain was found inadequate. After several shutdowns, it was replaced with Link-Belt SS-102½ chain with K-5 attachments at every third link.

This long-life, wear-resistant chain is now in its fourth year of uninterrupted operation. It has carried close to 350,000 tons as compared to 60,000 tons which was considered normal life for the previous chain.

Recent inspection of the SS-102½ chain reveals that it is good for another long stretch of service. Elimination of shutdowns and replacements more than justified the slight difference in cost between this and the original chain.



STONE ELEVATOR has buckets at every third link. Centers are 65 feet, with elevator inclined 75 degrees from the grade. Chain speed is 280 feet per minute.

HEADQUARTERS for chains, sprockets and other Link-Belt conveying and mechanical power transmission products is your nearby Link-Belt factory branch store or authorized stock-carrying distributor.

LINK-BELT

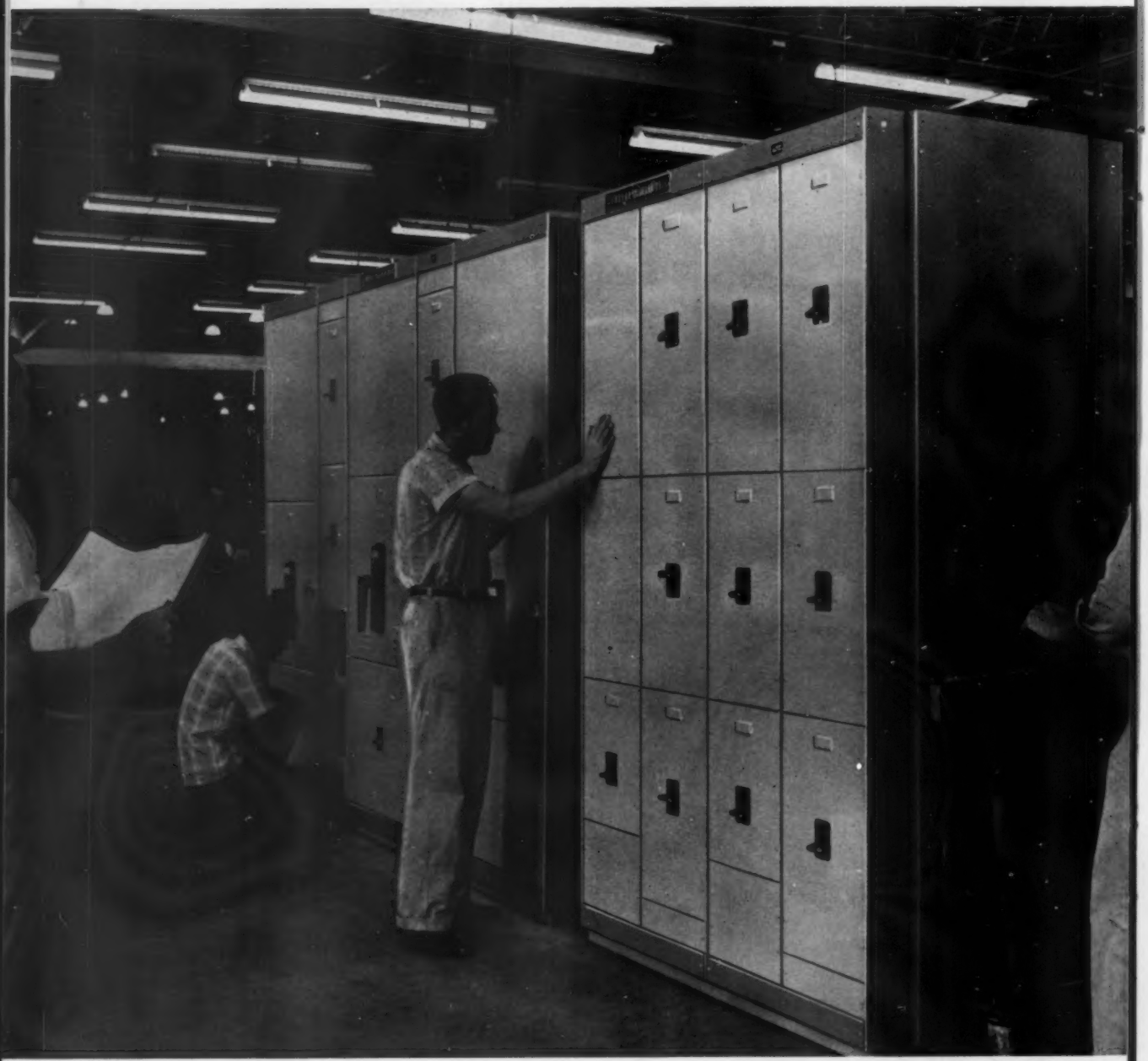
CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14294

For more facts circle 574 on Reply Card

General Electric reports ***New Progress*** *in switchboard design*

New Distribution Switchboard is easier



The new standardized switchboard accepts any combination of seven different types of protective devices: G-E molded case and large air circuit breakers; current-limiting molded case circuit breakers; combination circuit breakers and current-limiting fuses; fusible interrupter switches; and power protectors. In fact, the new Type DR allows you to add, replace or rearrange more types of protective devices in more combinations than ever before possible; in the field...quickly...and with minimum labor.

The new Type DR Switchboard comes in standard 28″, 35″ and 47″ widths. It is designed for 600-volt or less service and braced for 50,000 amperes asymmetrical (40,000 amperes symmetrical) short circuit current faults as standard, and for 100,000 amperes asymmetrical (85,000 amperes symmetrical) optionally. Its mains are rated 800 to 4,000 amperes.

For more facts circle 575 on Reply Card

to specify, estimate, install and expand

Built to pre-determined standards from pre-fabricated components, General Electric's new Type DR Universal Switchboard comes to you as a *known* quantity. It is pre-engineered and pre-tested to give assurance *in advance* of dependable on-the-job performance. We *know* its IC — we *know* its ampere capacities—we *know* its exact dimensions, its safety parameters, the capabilities of each of its components and other functional characteristics. *We* know them and *you* know them — *before* delivery of the switchboard. In addition, this new design and construction provide these other important benefits:

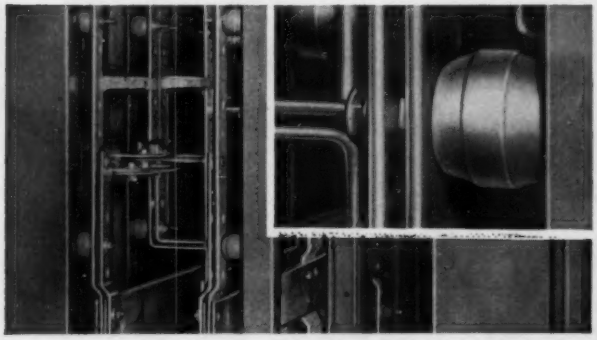
Cut hours from engineering, days from delivery. You can easily lay out and compute for yourself the size and cost of this universal switchboard from published information. Standardization means short-cycle manufacturing . . . frequently allows delivery in as little as one week . . . assures adherence to original delivery schedules, often in spite of last-minute specification changes.

Easier to install and maintain. Every terminal is easily accessible for quick, easy connections . . . unobstructed by bus bars or braces.

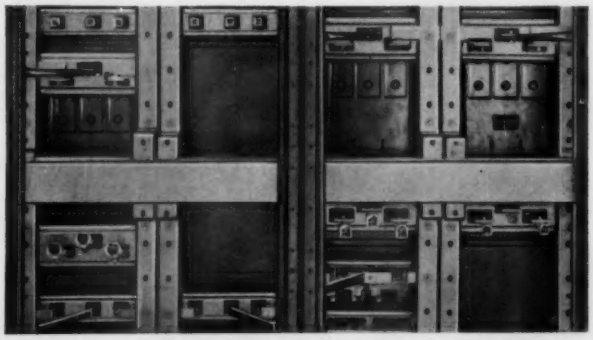
Easier to add capacity. You can easily double the useful capacity of this switchboard for future expansion or unexpected load requirements simply by adding an extra set of pre-drilled bus bars. Bus bars are silver plated, providing low contact resistance.

Easier to modify or expand. New switchboard sections can be added without special fabrication and with assurance of match and line-up. Breakers and switch units can be added or removed without disturbing the established load connections.

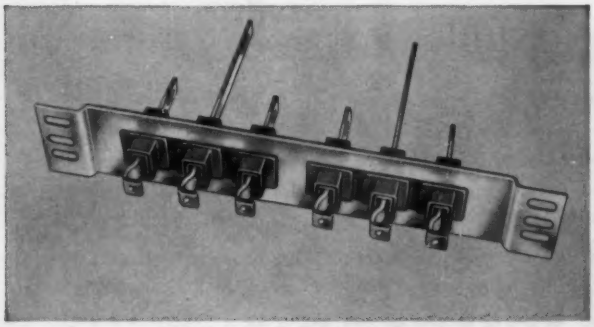
See your General Electric Representative or your authorized G-E Distributor for complete information on Type DR. Or write to **General Electric Company, Distribution Assemblies Department, Plainville, Conn.**



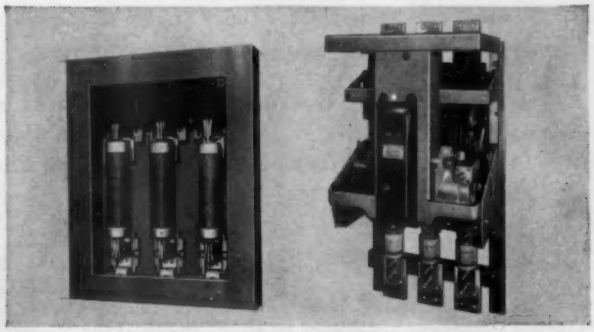
New molded bus insulator adds reliability. Molded in one piece of glass fiber-reinforced polyester, a new insulator increases the reliability of the entire switchboard. This insulator has high impact strength, high arc resistance and low moisture absorption.



Horizontal busing provides "elbow room," cuts installation and maintenance time. Main bus bars are at mid-height with vertical step-down bus bars off to each side. Entire rear of switchboard is open, above and below main bus, for full working access to back-connected protective devices.



Straight-in wiring, speedier installation with new stud assembly. Eliminates wire bending . . . allows "straight-in" wiring . . . opens up more working space to speed installation. Strong, light-weight, non-magnetic aluminum barrier mounts stud assemblies . . . minimizes heating from induction currents.



Latest in Fusible Components. This switchboard incorporates fusible interrupter switches with a 12-times load break rating at a price competitive with conventional pressure switches. Type QMR unit, left, is rated from 30-600A, and the Type LB-1 power protector, right, is rated 800-4000A.

Progress Is Our Most Important Product

GENERAL ELECTRIC

stop condensate backup

Nicholson steam traps discharge condensate and air from steam lines and equipment *faster* than any other trap of comparable size . . . help you make full use of your steam dollar. The reason—the effective use of a large orifice. A ½" Nicholson trap has a greater discharge capacity than most 1¼" traps . . . and costs less, too!

And that's not all. With just one thermostatically-operated moving part, there's nothing to get out of order, nothing to go wrong. Nicholson means continuous and low-cost operation of your steam-using equipment . . . no downtime from trap failure.

- **powerful valve action . . . no mechanical linkages to cause trouble.**
- **small and lightweight . . . easy to pipe and support.**
- **each unit steam-tested before shipment.**

So, to get a trap that discharges faster, saves money, specify Nicholson. W. H. NICHOLSON AND COMPANY, 14 OREGON ST., WILKES-BARRE, PA. *Sales and Engineering offices in 98 principal cities.*

Write for Bulletin 1055

NICHOLSON
of Wilkes-Barre

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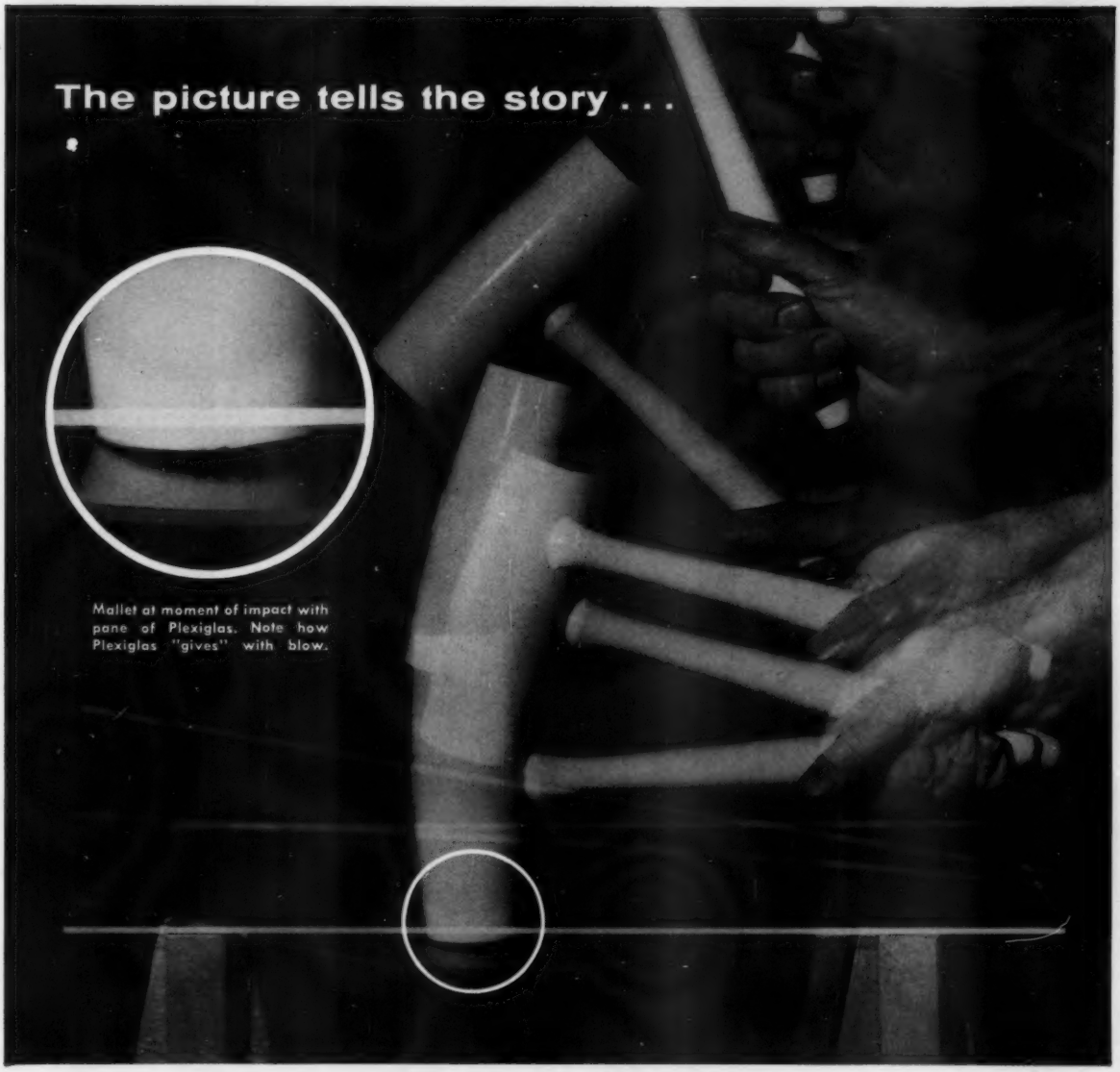


why **Plexiglas** is used for window glazing

Crystal clear PLEXIGLAS® acrylic plastic is as easy to see through as a hole in the wall. But what makes it so desirable as a glazing material is its stout resistance to breakage. A hard blow tends to flex it rather than break it. And it won't shatter.

PLEXIGLAS is also weather-resistant, light in weight, easy to handle (no sharp edges), easy to install, rarely requires replacement.

For information, sizes, prices and quick delivery call your dealer. He's under "PLEXIGLAS" in the plastics section of most classified telephone directories. Ask him about PLEXIGLAS R—the lower-cost grade that is especially suitable for industrial glazing.

Chemicals for Industry

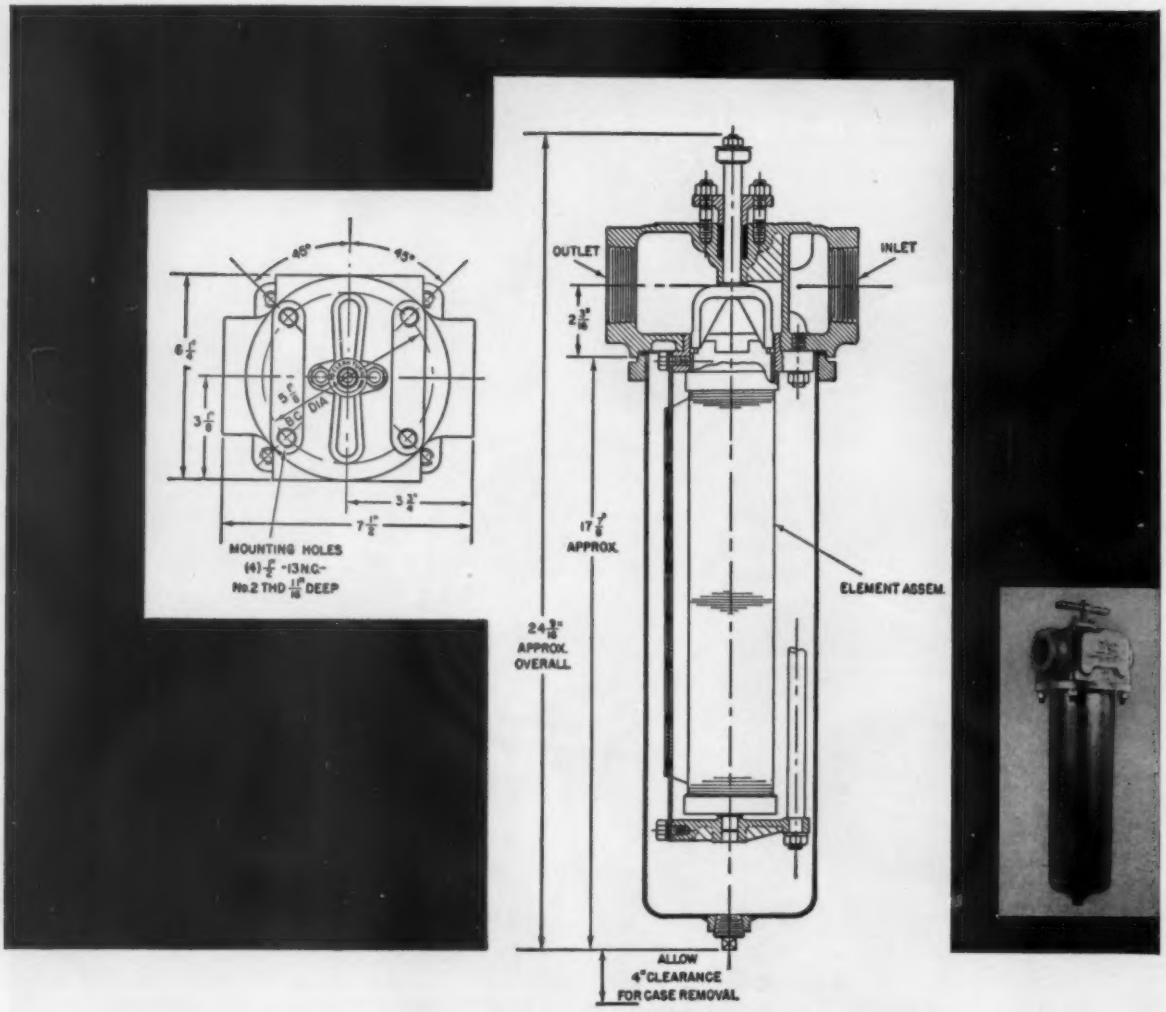
ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Canadian Distributor: *Crystal Glass & Plastics, Ltd., 130 Queen's Quay East, Toronto, Ontario, Canada.*

For more facts circle 577 on Reply Card



Your "special" filtration problems can be solved by standard Purolator filters

FOR EXAMPLE...This one standard Purolator filter is exactly right for all these "special" filtration problems:

inks, paints,
varnishes, machine tool coolants,
greases, vitamin solutions,
as well as fuel and lube oils.

This filter's specifications may recommend it for a problem of yours. If not, you're almost certain to find a standard Purolator filter that does meet your needs—exactly.

SPECIFICATIONS...This is Purolator filter model G-141J with simplex full flow metal element oil strainers. It is designed for primary or first stage filtration and can be installed on pressure or suction side of pump. Recommended for maximum capacities of 40 to 80 GPM, dependent on spacing which varies from .003 to .010. Relief valves set from 10-12 to 50 PSI are incorporated in several models. Motor driven knife blade to clean element can be furnished whenever conditions make manual rotation impractical. Head is made of high tensile cast iron, body of drawn steel. Inlet and outlet connections are 2", drain plugs are provided. Maximum pressure: 125 PSI; weight: 37 lbs.

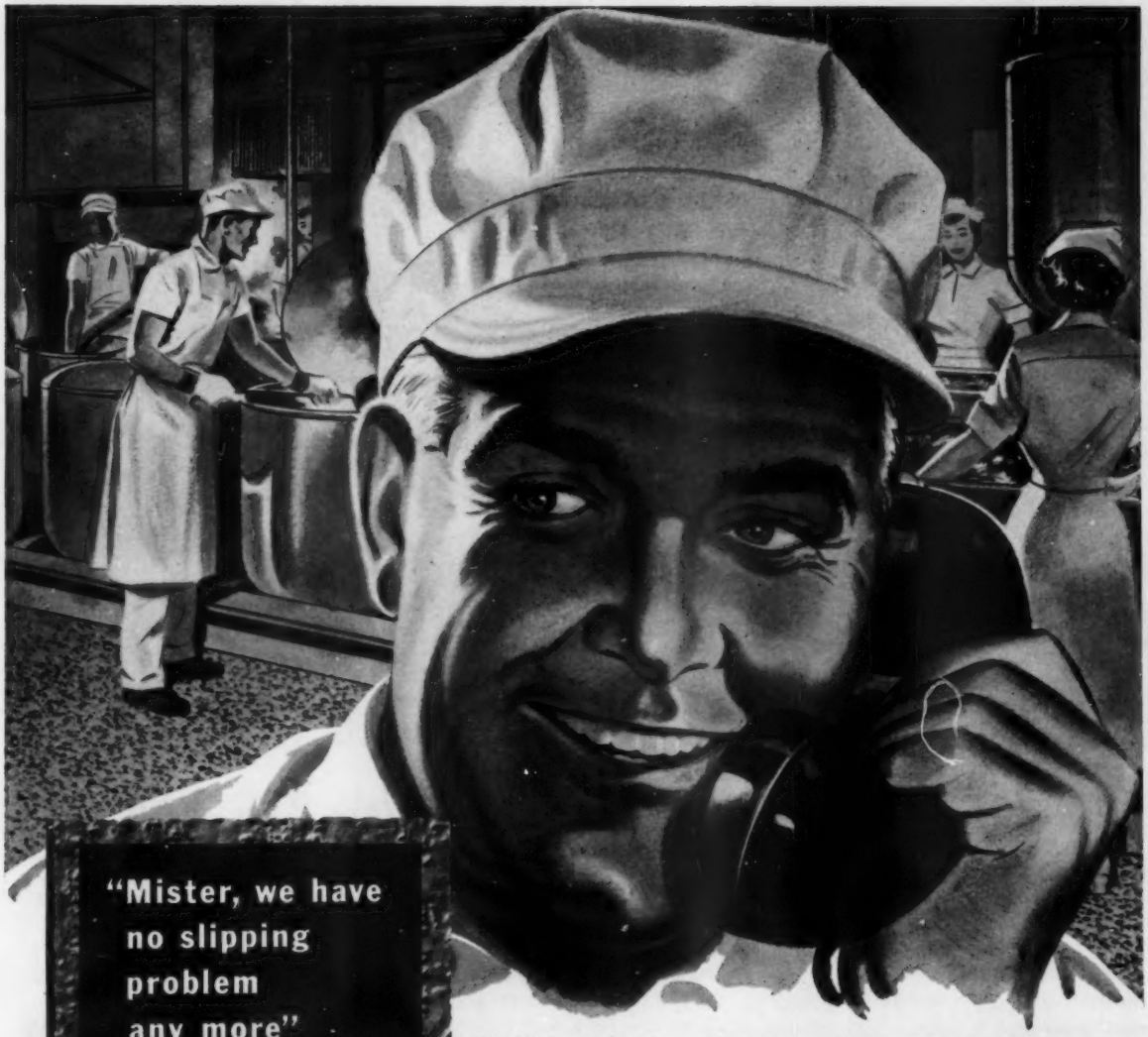
Remember, if these specifications don't match your needs, there's probably a filter that does at Purolator. Find out. Send in your problem.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada
For more facts circle 578 on Reply Card



"Mister, we have no slipping problem any more"

He did have though—and a dangerous one—until the company put in A.W. ALGRIP, the safety floor plate that provides super-safe footing under the most hazardous slipping conditions, including those caused by oil, grease or blood.

ALGRIP, the world's only abrasive rolled steel floor plate, is made by a patented process during which grinding-wheel type abrasive particles are rolled—not coated—to a controlled depth as an integral part of tough steel plate. Usage merely exposes more non-slip abrasive surface.

Make a test installation in your worst slipping area. Watch ALGRIP pay for itself as accident and insurance rates go down. ALGRIP fabricates easily and presents no maintenance problems.

ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

ALGRIP—*approved for safety by Underwriters' Laboratories*

ALAN WOOD STEEL COMPANY

Conshohocken, Pa.

Please send me A.W. ALGRIP Booklet AL-S29

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

OTHER PRODUCTS:
A.W. SUPER-DIAMOND economy rolled steel floor plate—Plates—Hot and cold rolled sheet and strip—(Alloy and Special Grades)

DUNLOP CUTS STEAM COST 23½% PER TIRE

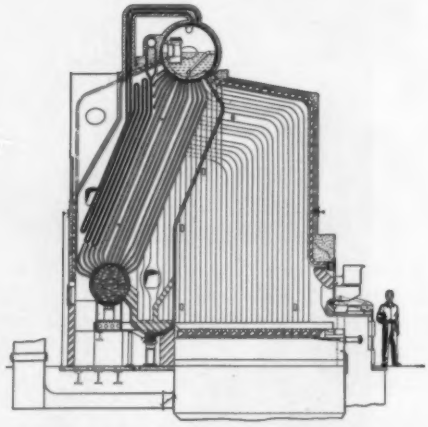
New B&W FP Boilers Burn Less Coal ...Supply Higher Temperature Steam

At Dunlop Tire & Rubber Company's Buffalo Plant, these big, modern curing presses are stepping up tire production. But they need plenty of dependable steam at fairly high temperature. The boilers they had couldn't do the job so they installed two new B&W Integral-Furnace Boilers.

These new boilers not only supply that "increased production" steam, but burn less coal and generate more steam than the old boilers, using the same limited space—a combination that cuts steam cost per tire 23½%.

Dunlop installed its first six B&W units in 1920, when the Buffalo Plant was new. Although still capable of reliable service after 37 years, the higher steam temperature demand of modern tire making has marked the four remaining old boilers for early replacement by more efficient B&W FPs.

Dunlop's experience with B&W boilers is typical of thousands of industrial, utility, commercial and institutional users. So if you use steam for power, processing or heating ... if you want to modernize or expand your plant ... if you have a steam plant problem of space or fuel or fly ash ... call B&W and get the benefit of 90 years of steam experience. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.



Each B&W FP unit can supply 40,000 lb of steam per hr at a pressure of 260 psi and temperature of 505 F. New boilers were specially designed to fit space used by old units they replaced. Zack C. Hinds, Buffalo, New York, was the Consulting Engineer on the project.

G-801-1B

BABCOCK & WILCOX

BOILER DIVISION

For more facts circle 580 on Reply Card

For more facts circle 581 on Reply Card ——→

Comparative Tests Prove . . .

Sunvis 900 Oils have years of useful life under severe operating conditions

Versatile, long-lasting Sunvis® 900 oils are especially made to provide superior lubrication at high temperatures and in the presence of moisture. *They keep maintenance costs low.*

Time and again, when checked against new-oil specifications, used Sunvis 900 oils prove themselves fit for many more years of continued service, with *no* loss in performance features.

For example: The 3-year-old sample above was used in an injection molding machine operated for 40-48 hours per week at temperatures between 100 and 125 F. To see how the used oil compares with its original specifications look at the following table.

Specifications	New Sunvis 916	Sunvis 916 After 3 Yr*
API gravity at 60 F	30.5-32.5	30.3
Flash, open cup, deg F, min	400	400
Fire, deg F, min	460	460
Viscosity, SUS at 100 F	150-160	173.0
Viscosity index	90	90
Neut. number	0.10	0.05
Color, ASTM	1-1.5	3.5

*Typical Test

HOW TO GET MORE INFORMATION

Call your Sun representative, or write for Technical Bulletin No. 35, Sun Oil Company, Philadelphia 3, Pa., Dept. I-7.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

© SUN OIL CO.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO and MONTREAL

SUNOCO®

SUBSTITUTES CRANES for BRAWN ...and BOOSTS LATHE PRODUCTION

One Crane for Every 6 Production Workers

Hand-propelled gantry cranes serve both sides of the Lathe Assembly Dept. 125 Cleveland Tramrail cranes, both standard overhead and gantry types, serve the Monarch plant.

EVERY manufacturer recognizes the need of mechanical handling equipment for hoisting and moving parts weighing hundreds of pounds, but not so many appreciate the value of cranes for handling parts that are within a man's ability to lift.

The Monarch Machine Tool Company, Sidney, Ohio, the world's largest exclusive manufacturer of lathes, made a thorough study of the effects of heavy manual lifting. They found that parts weighing only 50 or 75 pounds can be the cause of smashed fingers, hernias, and other injuries. When such parts must be handled numerous times a day, worker fatigue becomes a serious problem and affects not only production but workmanship.

Cleveland Tramrail cranes have proven to be the solution to the problem. For more than 15 years Monarch has been using Cleveland Tramrail equipment and today has 125 cranes of the standard overhead and gantry types which provide handling service throughout its fine modern plant. The importance attached to cranes here is attested by the fact that one crane is provided for every six production workers on the job at any one time.

WRITE FOR FREE COPY of Engineering and Data Booklet No. 2008. Packed with valuable information. Profusely illustrated.

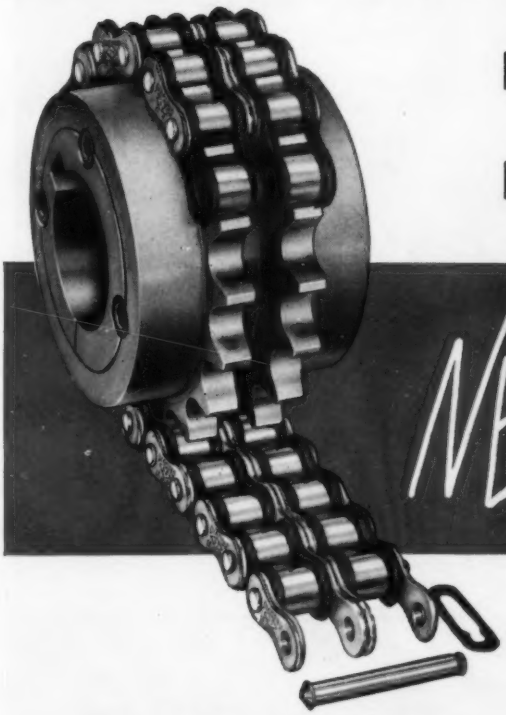
CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

7522 East 290 St., Wickliffe, Ohio.

For more facts circle 582 on Reply Card

NOW YOU CAN ALWAYS GET COUPLINGS WITH THE *Right* BORE FROM YOUR DIAMOND DISTRIBUTOR



NEW DIAMOND TAPER-LOCK COUPLINGS

★ **Interchangeable bushings eliminate reboring, save time and reduce costs.**

★ **Large selection of bushings fit all normal shaft sizes**

★ **Compact design—easy to install—wide range of horsepower capacities**

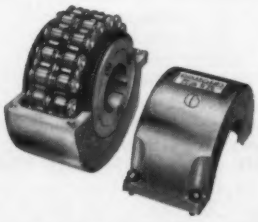
STOCK SIZES AVAILABLE

COUPLING SPECIFICATIONS

Number	Use with Bushing No.	Bore Min.	Bore Max.	Outside Diameter	Overall Length
D416	1008	½"	1"	3 1/32"	2 1/32"
D518	1610	½"	1 5/8"	4 3/16"	2 3/8"
D620	2012	½"	2"	5 1/2"	2 15/16"
D820	3020	1 3/16"	3"	7 13/16"	4 3/4"

CASING SPECIFICATIONS

Number	Use With	Diameter	Width
D416-B	D416	3 7/8"	1 15/16"
D518-B	D518	5 1/8"	2 5/16"
D620-B	D620	6 3/8"	2 15/16"
D820-B	D820	8 3/16"	4 7/16"



Here's a *new measure* of service to save you time and money!

Now your Diamond Distributor can solve your Coupling problems immediately—*from stock*. His selection of Diamond Taper-Lock Flexible Couplings includes a wide horsepower selection and a wide range of interchangeable bushings to fit any standard shaft diameter.

For all your flexible coupling requirements, call *NOW* on your Diamond Distributor. He has the knowledge and the Diamond Products to solve your power transmission problems!

DIAMOND CHAIN COMPANY, Inc.
Dept. 614, 402 Kentucky Ave.
Indianapolis 7, Indiana

WRITE FOR CATALOG NO. 7— JUST OFF THE PRESS!

Offices and Distributors in All Principal Cities

Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER.

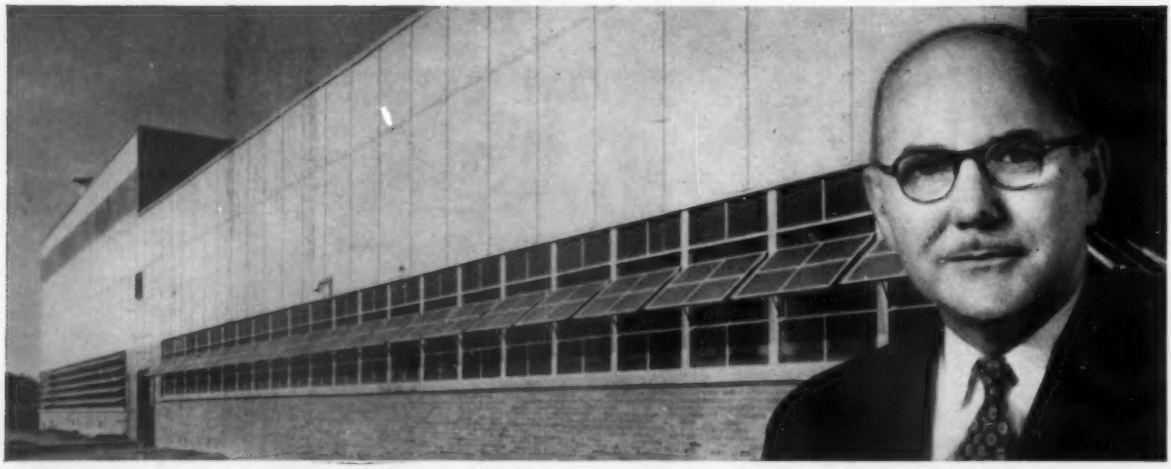
DIAMOND ROLLER CHAINS

For more facts circle 583 on Reply Card

"LURIA SAVED SNAP-ON TOOLS CORP. 10%

. . . full responsibility for construction, plus time-saving ideas, kept costs low."

WILLIAM C. NEMITZ, TREASURER



"DELIVERED NEW PLANT 6 MONTHS AFTER AWARD OF CONTRACT...

. . . helped us relieve congestion in existing plant and gave us more efficient production operation."

A. M. JENSEN, VICE PRESIDENT, MANUFACTURING

Architectural distinction, combined with a modern production layout for such diverse operations as forging, automatic screw machining, plating and packing, was what Snap-on Tools Corporation demanded in their new 44,000 sq. ft. plant and offices at Mt. Carmel, Ill.

What's more, they wanted the plant *fast* – to help relieve congestion in their existing plant and to provide needed capacity for relocation of production from other plants on a more efficient basis. A call to Luria provided the answer–a complete building package with many valuable innovations delivered only 6 months after awarding of the contract. Full responsibility by Luria for architectural and engineering services as well as for fabrication and construction saved Snap-on's Engineering Department considerable time, work and expense. And Luria's methods of construction, together with its complete steel stocks and modern fabrication facilities meant further savings. The Snap-on Tools Corporation not only got their building quickly but also saved an estimated ten percent.

The comments of Snap-on executives quoted here tell their own story. Luria can perform similar services for you. For further information, call the Luria representative in the cities listed below. Or call LURIA ENGINEERING COMPANY, 511 Fifth Avenue, New York 17, New York.

LURIA MEANS FULL RESPONSIBILITY

DISTRICT OFFICES: ATLANTA · PHILADELPHIA · BOSTON · CHICAGO · NEW YORK · WASHINGTON · PITTSBURGH · RICHMOND · DAYTON

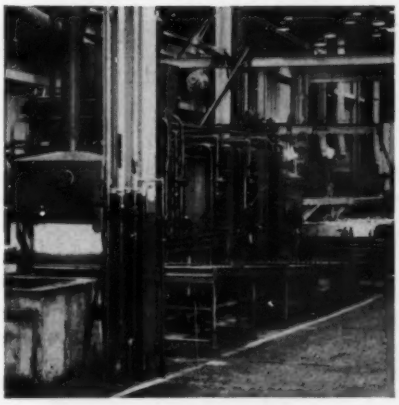
PLANTS: BETHLEHEM, PA. · CHICAGO HEIGHTS, ILL.

For more facts circle 584 on Reply Card

STEELCOTE MAINTENANCE NEWS

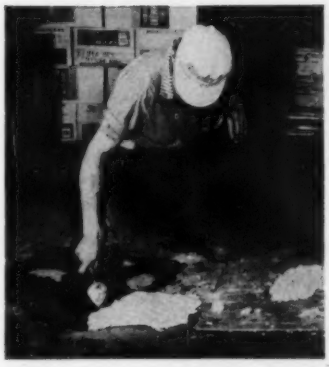
1957 FEATURING THE LATEST COST REDUCERS IN MAINTENANCE 1957

NEW PAINT FOR MACHINERY, EQUIPMENT AND STRUCTURAL STEEL HOLDS 10 PERFORMANCE RECORDS



Steelcote EPO-LUX 100, the latest product of paint research, is the most chemically resistant type air dry organic finish known. Its resistance to acids, alkalis, salt and solvents exceeds any other type paint. Other new records achieved by EPO-LUX 100 are: Superior adhesion, impact and abrasion resistance; unexcelled gloss; 75% of hardness of glass without brittleness. Brush or spray application. For recommendations on use of EPO-LUX 100 in your plant, write us describing your problem.

Steelcote FLOOR-NU Patches and Resurfaces Where Chemicals and Abrasion Destroy Concrete, Wood, Metal Floors, Walls and Tile Grout



Where heavy trucking, abrasion, acids, salts, solvents or alkalis ruin structural surfaces, new patent-applied-for FLOOR-NU makes a tight bond repair or resurfacer that defies these abuses. It will not shrink. Can be feather edged. Comes ready to trowel. Five times stronger than concrete. Can be trucked overnight. Not an asphalt product.

Thickness of ⅛" Sufficient for Heavy Trucking. No Need to Move Machinery.

FOR PAINT ENGINEERING RECOMMENDATIONS ON ANY MAINTENANCE PROBLEM, WRITE DEPT. 11 DESCRIBING PROBLEM

Steelcote MFG. CO., 3418 GRATIOT, ST. LOUIS 3, MO. U.S.A.

JOBBERS IN PRINCIPAL CITIES

IN CANADA: STEELCOTE MFG. CO., LTD., RODNEY, ONTARIO

STEELCOTE EPO-LUX ZINC RICH Z-D PRIMER GIVES CATHODIC ACTION OF GALVANIZING

Costs Approximately 2/3 Less Than Hot Sprayed Zinc

The unequalled rust inhibitive qualities of zinc have been established by the universal usage of galvanizing. Now this same type protection can be given steel in on site application without vulnerability of the zinc to attacks of acids and alkalis. Now for the first time you can apply by brush, spray, or roller a coating of over 90% pure zinc metal. It has such tremendous adhesion that overcoats of EPO-LUX 100, resisting acids and alkalis can be added, assuring the longest-lasting and most effective corrosion prevention possible.

FOR MOST SATISFACTORY PAINTING OF WET WALLS

America's Quality Leader is STEELCOTE DAMP-TEX

Transforms wet dingy surfaces into cheerful porcelain-like beauty. DAMP-TEX permits surface moisture to escape. Then it dries into a hard, porcelain-like enamel film that withstands repeated washings for years. Fungus and bacteria killer can be added to DAMP-TEX before application to assure maximum sanitation.

For more facts circle 585 on Reply Card

CLARK Type "CY" Starters, sizes 0 and 1, now have higher NEMA horsepower ratings

As shown in the table below, NEMA maximum horsepower ratings for size 0 and 1 AC magnetic across-the-line starters have been increased. Clark Type "CY" starters now available to meet these new standards will, in many cases, permit you to meet your requirements with smaller sizes. You can at once take advantage of the money and space savings made possible by this re-rating.

CHANGES IN NEMA STANDARDS FOR MAXIMUM HORSEPOWER RATINGS OF AC MAGNETIC STARTERS AND CONTACTORS

SIZE AND VOLTAGE RATINGS	MAXIMUM HP RATINGS	
THREE PHASE	OLD	NEW
Size 0 110V	1½	1½
Size 0 208/220V	2	**3**
Size 0 440/600V	3	**5**
Size 1 110V	3	3
Size 1 208/220V	5	**7½**
Size 1 440/600V	7½	**10**
SINGLE PHASE		
Size 0 110V	1	1
Size 0 208/220V	1½	**2**
Size 0 440/600V	2	**3**
Size 1 110V	1½	**2**
Size 1 208/220V	3	3
Size 1 440/600V	5	5

NOTE: HP ratings for plugging and jogging duty have not been revised.

IN ADDITION TO COST AND SPACE SAVING BENEFITS OF THE NEW NEMA RATINGS, CLARK Type "CY" STARTERS OFFER MANY OTHER ADVANTAGES:

Greater Dependability and longer life

- Heavy-duty mill-type construction.
- Large silver-to-silver twin-break contacts.
- Vertical lift, free-floating magnet uses no springs; pull characteristic assures positive contact closing and keeps magnet slam to a minimum.

Easier Maintenance

- Contacts and contact springs quickly and easily inspected—without tools.
- All parts readily accessible and replaceable from front without removal from panel or enclosure—screwdriver and wrench only tools needed.
- Magnet coils easily replaced.

Simplified Installation

- Generous wiring space.
- All terminals face the front.
- Pressure-type terminals line and load.

...and many others

These increased horsepower ratings for AC controls will be adopted for all forms of Clark across-the-line starting equipment.

Revised Clark Catalog sheets and price lists covering the new NEMA ratings are available on request.

The **CLARK CONTROLLER** *Company*

Everything Under Control — 1146 East 152nd Street • • Cleveland 10, Ohio

IN CANADA: CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

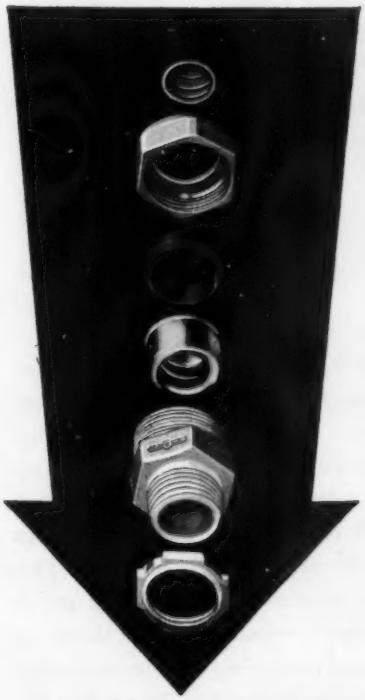
For more facts circle 586 on Reply Card

GEDNEY

TOPS THEM ALL!

...in malleable iron quality
...in accurate machining
...in smooth-fitting threading

ROCK-BOTTOM INSTALLATION COSTS... specify Gedney. Machined and threaded with utmost accuracy...smooth-finished, with no metal particles or burrs ... made of the best malleable iron to eliminate breakage...individually inspected to insure absolute top quality. For today's lowest installation cost.... specify Gedney!



LIQUID-TITE CONNECTORS
The most dependable liquid-tight connectors available today. For use with "SEALTITE" and equivalent Liquid-Tite Flexible Conduit. Designed to give wiring absolutely dependable protection against water and oil. Built for lifetime service. Available in sizes ⅜" to 2"... straight... 45° and 90°.

90° CORNER ELLS
Top-quality Malleable Iron, cadmium plated. Fitted with gasketed cover. Both ends female. Available in a full range of sizes from ½" to 2".

90° CORNER ADAPTERS
Top-quality Malleable Iron, cadmium plated. Fitted with gasketed cover. One end male, one end female. In sizes from ½" to 2".

GEDNEY FITTINGS FIT

GEDNEY
ELECTRIC COMPANY
GEDNEY
RKO BLDG., RADIO CITY, NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

For more facts circle 587 on Reply Card

General Electric says:

"On the average, only 1 out of 100 G-E Lamps will burn out during the first year of service in a single shift operation."

Harold Kilburg, electrical contractor, says:

"Out of 5,150 G-E Lamps we installed a year ago, we've had to replace only 20. That's 1 out of 250!"

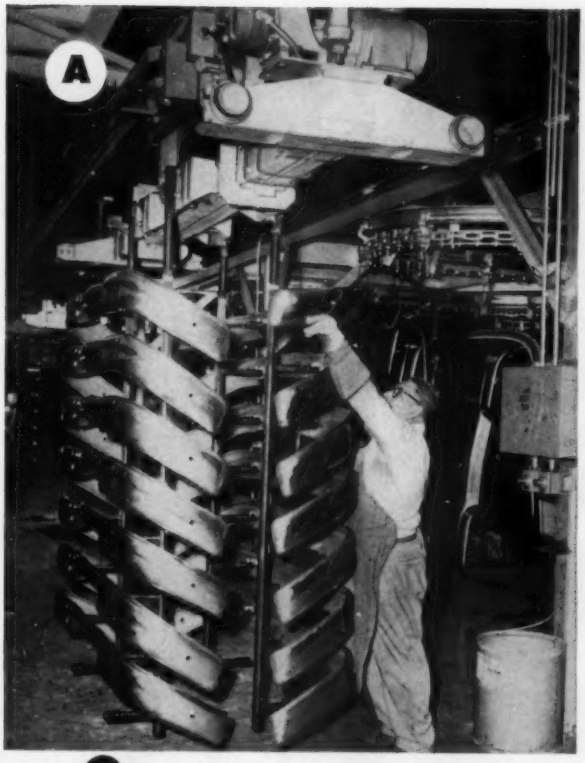
MR. KILBURG (center), president of Kil-Bar Electric Co., Chicago, inspects one of the G-E Lamps that has given such excellent service. Leo Carmody (left), wholesale agent salesman, and Larry King, G-E Lamp Salesman, worked together on this installation.

YOUR *cost of light* is about 10 times the cost of the lamps. It's also the cost of the electricity they use . . . and the cost of maintaining the system. If you buy lamps with unpredictable life, you'll have lots of early burnouts which require individual replacement. But G-E Lamps have a uniform life with few early burnouts. This means you can schedule an economical group relamping program (replace all your lamps at the same time) and realize big savings in maintenance that far outweigh the little light left in the lamps. For full information on this way to improve your lighting and save money, too, write: General Electric Co., Large Lamp Dept. PE-97, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 588 on Reply Card



AMERICAN MONORAIL

teams with *Udylite*

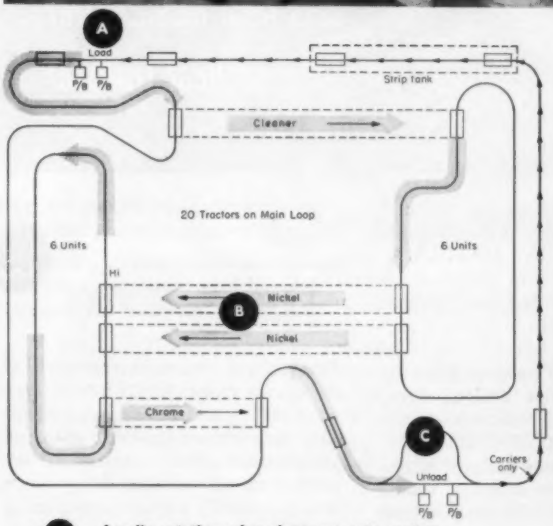
plates auto bumpers at Rheem Automotive plant

Combined engineering skills resulted in substantially reduced handling costs for the plating of auto bumpers at the new Rheem Automotive plant at Fullerton, California.

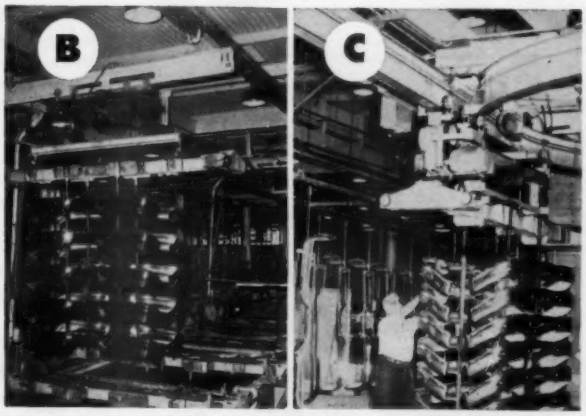
32 American MonoRail automatic dispatch units move special Udylite bumper carriers on three monorail systems with 14 drop sections to maintain continuous automatic plating.

Let American MonoRail engineers combine to solve your handling problems.

Write for Bulletin C-1.



A— Loading station where bumpers enter system.
B— Bumpers move through nickel tanks.
C— Inspection and unloading station.



Member of Materials Handling Institute and Monorail Manufacturers Association

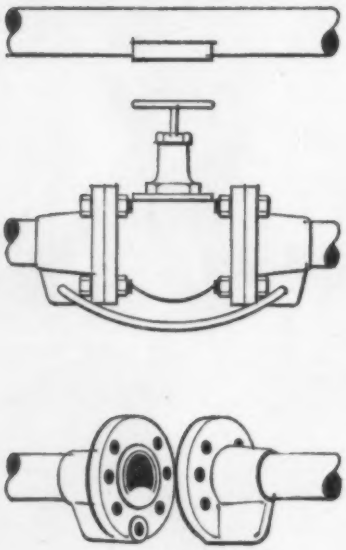
For Power Driven Conveyors, Use Landahl Chainless Conveyors

AMERICAN MONORAIL COMPANY

13123 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

For more facts circle 589 on Reply Card

With this new round shape, UNITRACE costs substantially less per foot. And since the steam passage has less outside wall area, external radiation heat loss is reduced. The need for thermal insulation is often eliminated. When insulation is used, it costs less because standard pre-formed pipe covering can be used.
to cut costs,
boost efficiency
of steam traced pipe...
ALCOA UNITRACE has a NEW SHAPE
for lower cost per foot...
easier joining...
less heat loss...better
internal heat transfer



Sections of UNITRACE in the new shape can be easily and quickly joined by the weld and patch method (top). And a brand new UNITRACE flange—with product and steam passages cast as integral parts of the flange—simplifies installation of valves (center) and other flanged connections (bottom).

Want to save money on steam-traced piping? Here's good news for your pocketbook! ALCOA® UNITRACE *has a new cost-cutting shape* . . . a round section matching standard pipe shapes . . . available in 1½", 2", 3" and 4" sizes.

With steam and product passages extruded in a single unit of light, strong, corrosion-resistant Alcoa aluminum alloy 3003-F, UNITRACE completely eliminates the cost of external steam jackets or tracer tubes. And the new UNITRACE shape makes possible these *extra* savings:

Lower cost per foot . . . total volume of metal is less; material costs are lower.

Easier, faster joining . . . new configuration (with exterior grooves for quick steam passage identification) makes mating and joining fast and simple to cut installation costs.

Less external heat loss . . . Improved internal heat transfer . . . the new design reduces area for external radiation loss.

The natural corrosion resistance of aluminum makes UNITRACE ideal for handling naval stores, molten sulfur, ammonium nitrate solutions, glacial acetic acid, fatty acids, tar, pitch, wax, urea and similar products which normally require heated transfer lines.

Find out today how *you* can use ALCOA UNITRACE to cut costs and improve efficiency of your heated transfer lines. Call your nearest Alcoa sales office, or write Aluminum Company of America, 889-J Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

Write for this FREE BOOKLET!
This new, illustrated booklet contains complete engineering, specification and fabrication data on ALCOA UNITRACE in the new shape. It's your guide to low cost heated transfer lines. Write for it today!

For more facts circle 590 on Reply Card

Rust-Oleum is distinctive as your own fingerprint. Accept no substitute.

. . . goes on faster, stops rust, lasts longer over rust!

ONE MAN often does the work of two!

EASIER TO USE—because Rust-Oleum 769 Damp-Proof Red Primer goes over rusted metal after scraping and wirebrushing to remove rust scale and loose rust—usually eliminating costly surface preparations. *Stops Rust*—because Rust-Oleum's specially-processed fish oil vehicle *penetrates* rust to bare metal—driving out air and moisture that cause rust.

LASTS LONGER applied over rust—and teamed up with Rust-Oleum's many attractive finish coatings, assures lasting beauty. Try Rust-Oleum on *your* tanks, metal sash, machinery, wire fences, stacks, girders—or around *your* home. Prompt delivery from Industrial Distributor stocks. Write for illustrated literature with color charts showing colors and applications.

RUST-OLEUM CORPORATION • 2608 Oakton Street • Evanston, Illinois

RUST-OLEUM®

30% GREATER COVERAGE—MANY ATTRACTIVE COLORS

Rust-Oleum covers up to 30% more area, depending upon surface condition and porosity. And you can beautify as you protect with Rust-Oleum finish coatings in Aluminum, White, Red, Gray, Green, Blue, Yellow, Black, etc.

STOPS RUST!®

Rust-Oleum and Stops Rust are brand names and registered trademarks of the Rust-Oleum Corporation.

Write for special report showing Rust-Oleum penetration to bare metal.

How CB&I customers save insurance overhead

with overhead water storage

80% insurance savings at Motorola. This 100,000-gal. Watersphere® serves a sprinkler system installed at the company's Quincy, Illinois plant. 80% premium reduction will pay for fire protection system in about six years.

Insurance cost reduced from $25.50 to $5.00 per thousand at Crest Company. A 100,000-gal. Horton® elevated tank serves a sprinkler system at this Edgefield, S.C. auto seat cover plant. 80% reduction in premiums will pay for system in seven years.

$5,000 yearly drop in insurance rates at Line Material Company. Water will flow the minute a sprinkler opens in the 842-head system at Line Material Company's Olean, New York plant—thanks to dependable gravity pressure supplied by this Horton elevated tank.

90% savings realized at Ball Brothers. A 100,000-gal. Watersphere combines beauty and utility; safety *and*, with Ball Brothers automatic sprinkler system, a 90% savings in insurance rates.

Horton elevated water tanks are the *first line* of plant security for many progressive operators all over the country. The importance and dependability of gravity pressure water supply, not only for general water supply and fire protection—but for *actual insurance dollar savings* is here attested by the experience of a few of our customers. Write *your* nearest CB&I office for further details on Horton elevated water tanks, Waterspheroids® or Waterspheres.

E50

CB&I

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Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.
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FAN FACTS

COVERING MOST OF YOUR VENTILATION NEEDS —ARE IN THESE THREE BULLETINS

LARGE CENTRAL SYSTEMS — "Buffalo" Type "BL" Ventilating Fans are the favorite choice for jobs requiring up to 500,000 cfm — supplying large distribution systems, air washers and air conditioning units where extreme efficiency and quiet operation are desired. Excellent performance is assured even where unfavorable inlet conditions exist. Bulletin F-102 gives construction and performance data. Write for your copy and check this popular fan against your needs.

SMALL SYSTEMS AND ZONES — For ventilating small areas — or power roof exhaust — "Buffalo" Belted Vent Sets combine the economical installation of light-weight "package" fans with the efficiency and quietness of larger "Buffalo" fans. Adjustable motor mounts and accessible sheaves permit changing speeds (capacity) at any time — and the Limit-Load® characteristic prevents overloading. For indoor or outdoor installation (with all-weather cover). Write for Bulletin 3720.

LIGHT-DUTY AIR MOVING — For ventilation and air conditioning service against static pressures up to 2" — where straight duct conditions are possible — you'll get top efficiency with "Buffalo" Axial Flow Fans. These duct-size fans are light enough for mounting as part of the duct, with little support. Can be installed in stacks or hooded exhaust systems. Bulletin 3533 gives all details, including chart comparing performance of axial flow and centrifugal fans.

The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life — is in every "Buffalo" Fan

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

NEW Airco POP can seals out dampness...

keeps stainless steel electrodes "oven fresh" in re-usable aluminum container — eliminates special storage facilities!

Airco Stainless Steel Electrodes are now packed in seamless aluminum containers. Each "POP" can contains 10 pounds of electrodes, and is sealed with a waterproof airtight industrial tape.

This hermetic electrode packaging technique is the best way to keep stainless steel electrodes "oven fresh"—without benefit of special shop or field storage equipment. Unused electrodes can be kept fresh by resealing the can.

Airco Stainless Steel Electrodes, in the "POP" can, are but one of many types in Airco's complete line that also includes hard-facing, cast iron, mild steel, general, and special purpose electrodes. Send for the free Airco Electrode Guide which will help you select the right electrode for your special job.

AT THE FRONTIERS OF welding PROGRESS YOU'LL FIND . . .

AIR REDUCTION SALES COMPANY

AIRCO

A division of Air Reduction Company, Incorporated
150 East 42nd Street, New York 17, N. Y.

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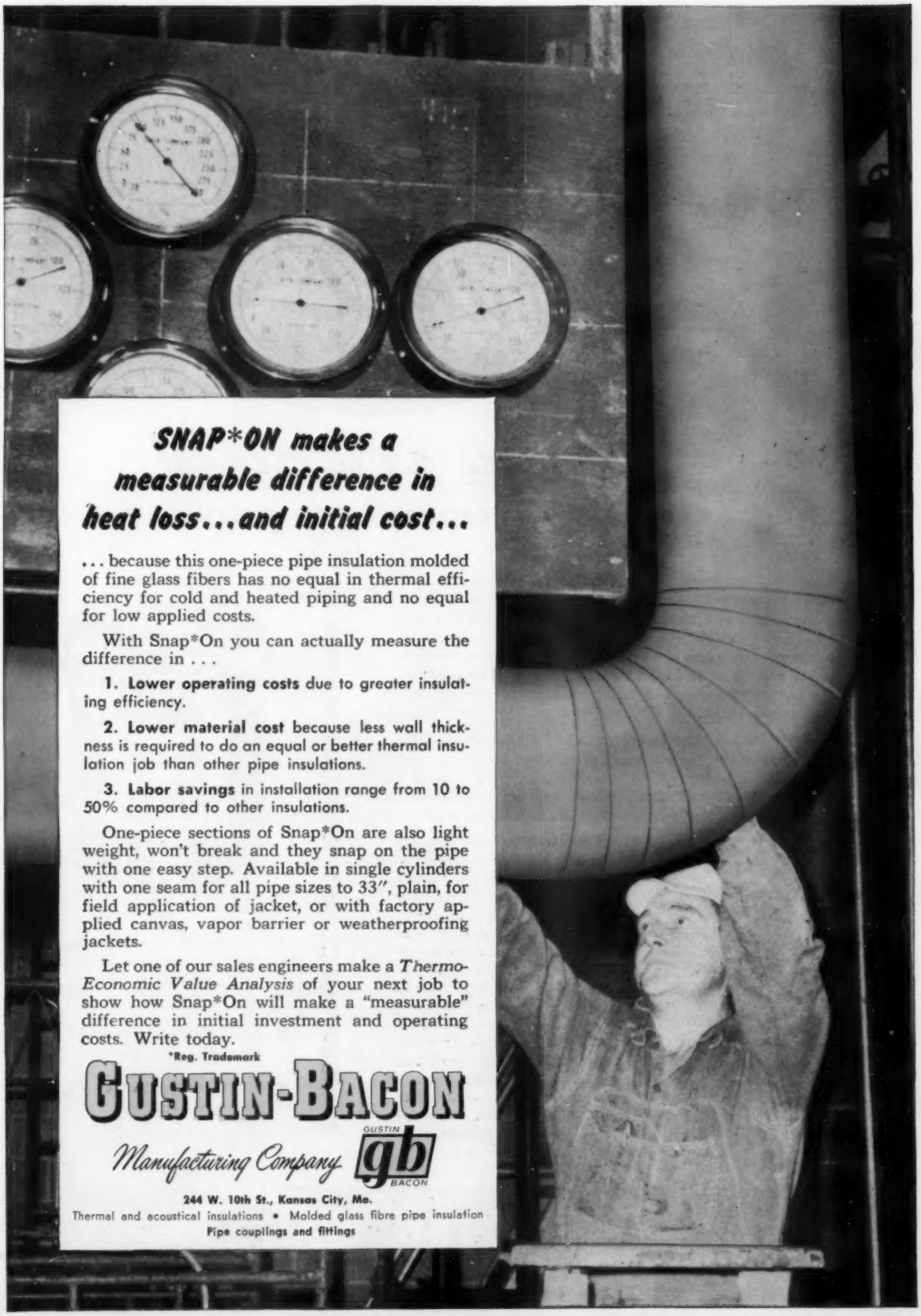
Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide — gaseous, liquid, solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl acetate, alcohols, and other synthetic resins.

For more facts circle 594 on Reply Card



*SNAP*ON makes a measurable difference in heat loss...and initial cost...*

... because this one-piece pipe insulation molded of fine glass fibers has no equal in thermal efficiency for cold and heated piping and no equal for low applied costs.

With Snap*On you can actually measure the difference in . . .

1. **Lower operating costs** due to greater insulating efficiency.

2. **Lower material cost** because less wall thickness is required to do an equal or better thermal insulation job than other pipe insulations.

3. **Labor savings** in installation range from 10 to 50% compared to other insulations.

One-piece sections of Snap*On are also light weight, won't break and they snap on the pipe with one easy step. Available in single cylinders with one seam for all pipe sizes to 33", plain, for field application of jacket, or with factory applied canvas, vapor barrier or weatherproofing jackets.

Let one of our sales engineers make a *Thermo-Economic Value Analysis* of your next job to show how Snap*On will make a "measurable" difference in initial investment and operating costs. Write today.

*Reg. Trademark

GUSTIN-BACON

Manufacturing Company GUSTIN gb BACON

244 W. 10th St., Kansas City, Mo.

Thermal and acoustical insulations • Molded glass fibre pipe insulation
Pipe coupligns and fittings

CARING FOR WAXED FLOORS IS . . .

A cinch with Sanax

It waxes as it cleans!

REDUCES THE FREQUENCY OF REFINISHING

Sanax was developed to permit frequent cleaning of waxed floors *without washing away the finish* . . . and to eliminate waste in wax and labor. A neutral liquid soap with a wax base, *Sanax* not only quickly removes dirt, oil, and grease, but *leaves a thin film of wax.* In fact, regular use of *Sanax* to machine-scrub or damp-mop waxed floors *actually prolongs the life of the finish,* and thereby reduces refinishing costs on a year-to-year basis.

Like all *Finnell Fast-Acting Cleansers, Sanax* is specially designed for the greater speed of machine-scrubbing, and works as effectually in a *Combination Scrubber-Vac* as in a *Conventional Scrubber-Polisher.* And because *Sanax* is processed from pure vegetable oils, it's *safe for all floors.*

Find out how you can simplify and reduce the cost of caring for waxed floors. *There's a Finnell Floor Specialist nearby* to help you choose the waxes and cleansers that are *exactly right for your needs. Finnell* makes a complete line, so you can depend on unbiased advice. In fact, *Finnell makes everything for floor care!* For consultation, demonstration, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 5309 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

- **A mild liquid wax-soap for machine-scrubbing or damp-mopping waxed floors**
- **Leaves a lustrous anti-skid protective finish**
- **Highly concentrated . . . economical to use**

FINNELL SYSTEM, INC.

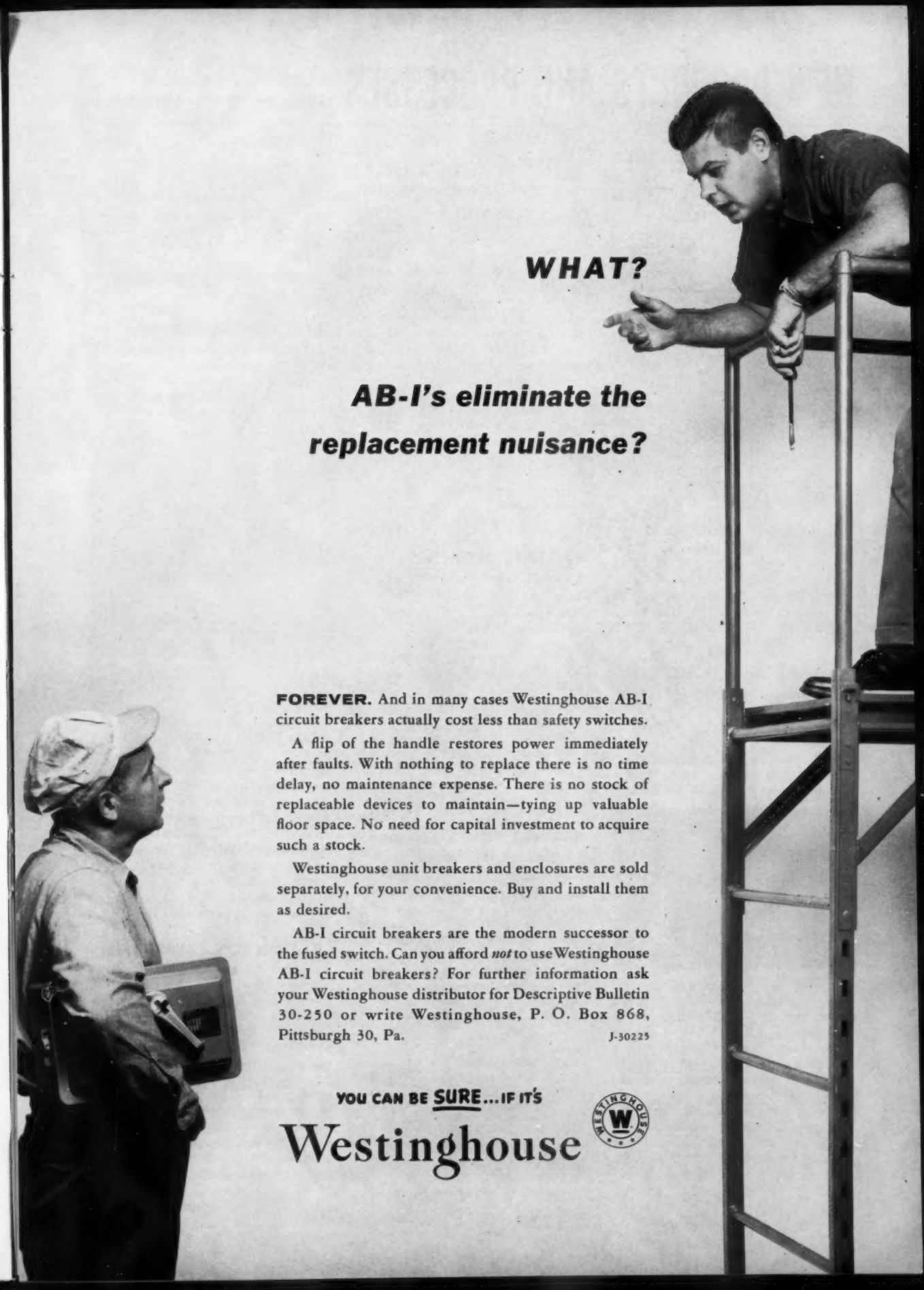
Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

For more facts circle 596 on Reply Card

For more facts circle 597 on Reply Card →



WHAT?

AB-I's eliminate the replacement nuisance?

FOREVER. And in many cases Westinghouse AB-I circuit breakers actually cost less than safety switches.

A flip of the handle restores power immediately after faults. With nothing to replace there is no time delay, no maintenance expense. There is no stock of replaceable devices to maintain—tying up valuable floor space. No need for capital investment to acquire such a stock.

Westinghouse unit breakers and enclosures are sold separately, for your convenience. Buy and install them as desired.

AB-I circuit breakers are the modern successor to the fused switch. Can you afford *not* to use Westinghouse AB-I circuit breakers? For further information ask your Westinghouse distributor for Descriptive Bulletin 30-250 or write Westinghouse, P. O. Box 868, Pittsburgh 30, Pa. J-30225

YOU CAN BE **SURE**... IF IT'S

Westinghouse

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 277-278.

1—LIGHT CONTROL reacts to daylight intensity

The Type 21BJ3 Photoelectric Light Control is designed to provide automatic on-off control any lighting system with operation related to outdoor light conditions. The control reacts automatically to actual daylight intensity, it is announced, and is unaffected by seasonal changes, weather or time of day — lights go on when needed. Reliability is attributed to advance circuitry requiring only a single amplifier tube. Fuse and sensitivity control can be reached without removing plastic cover. It is noted that should a component fail, the controlled lights remain on, giving normal night-time operation and indicating daytime trouble. Photo-switch Div., Electronics Corp. of America.

2—HOSE NOZZLE HOLDER clamps to machine tools

This magnetic air-hose nozzle holder clamps to machine tools at point of use. It consists of a pliable rubber nozzle fastened to Alnico magnets of 110- or 35-lb pulling power. Finger pressure starts the flow of air through

the nozzle, and air is shut off as pressure is released. While this nozzle holder remains anchored in a convenient position when in use, it can be removed and clamped to any part of the machine if desired. It can also be adapted to position coolant tubes and paint spray nozzles. It is noted in addition to convenience and safety advantages, the device permits use of shorter air hoses, which can stretch directly from the air line to the machine in use. The Dilley Mfg. Co.

3—ELECTRICAL TAPE can jacket as well as insulate

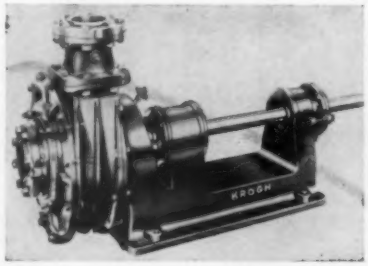
Okoweld is introduced for splicing and terminating plastic or rubber cables. For connections operating under 2000 v it serves as both insulation and sheath, says manufacturer, no other tape being required. This "two-tapes-in-one" feature is possible because Okoweld, while possessing optimum electrical characteristics, is also resistant to weather chemicals, flames, and mechanical abuse, it is explained; it can jacket as well as insulate. Upon application, this tape rapidly fuses into a solid homogenous wall around the connection, company states; no adhesives are involved. Okoweld is announced as UL listed and approved for use as "sole insulation and covering of joints and splices in electrical conductors." It comes in five colors. The Okonite Co.

4—POWER SWEEPER is compact and economical

Model 604 is designed to sweep plants indoors and out where narrow and congested areas will not permit effective power sweeping by larger sweepers. It is priced for small plant budgets, and although its overall width is only 38-¾ in., the Model 604 can sweep a 30-in. swath. Features announced for it include a larger effective dirt hopper capacity, Filter-Vac system (no dust bag), automotive transmission (three speeds forward, one reverse) and automotive type steering. Wayne Mfg. Co.

5—LINED PUMPS for sand and slurry handling

Model 600 is a heavy duty sand and slurry pump equipped with wear-resistant liners, replaceable and interchangeable with either hard metal or rubber. This flexibility makes the pump suitable for any slurry pumping problem, says manufacturer, or allows it to accommodate changes in operating conditions. The pumps are built for sand, slurries, or gritty water on flotation processes, cyclone feed, refuse or tailings disposal, ash handling in washers and pipelines and similar applications. They range in sizes from 2 to 8 in., capacities from 20 to 2000 gpm. Bulletin 601 gives details. Krogh Pump & Equipment Co.



6—PLASTIC TUBING protects things stored outdoors

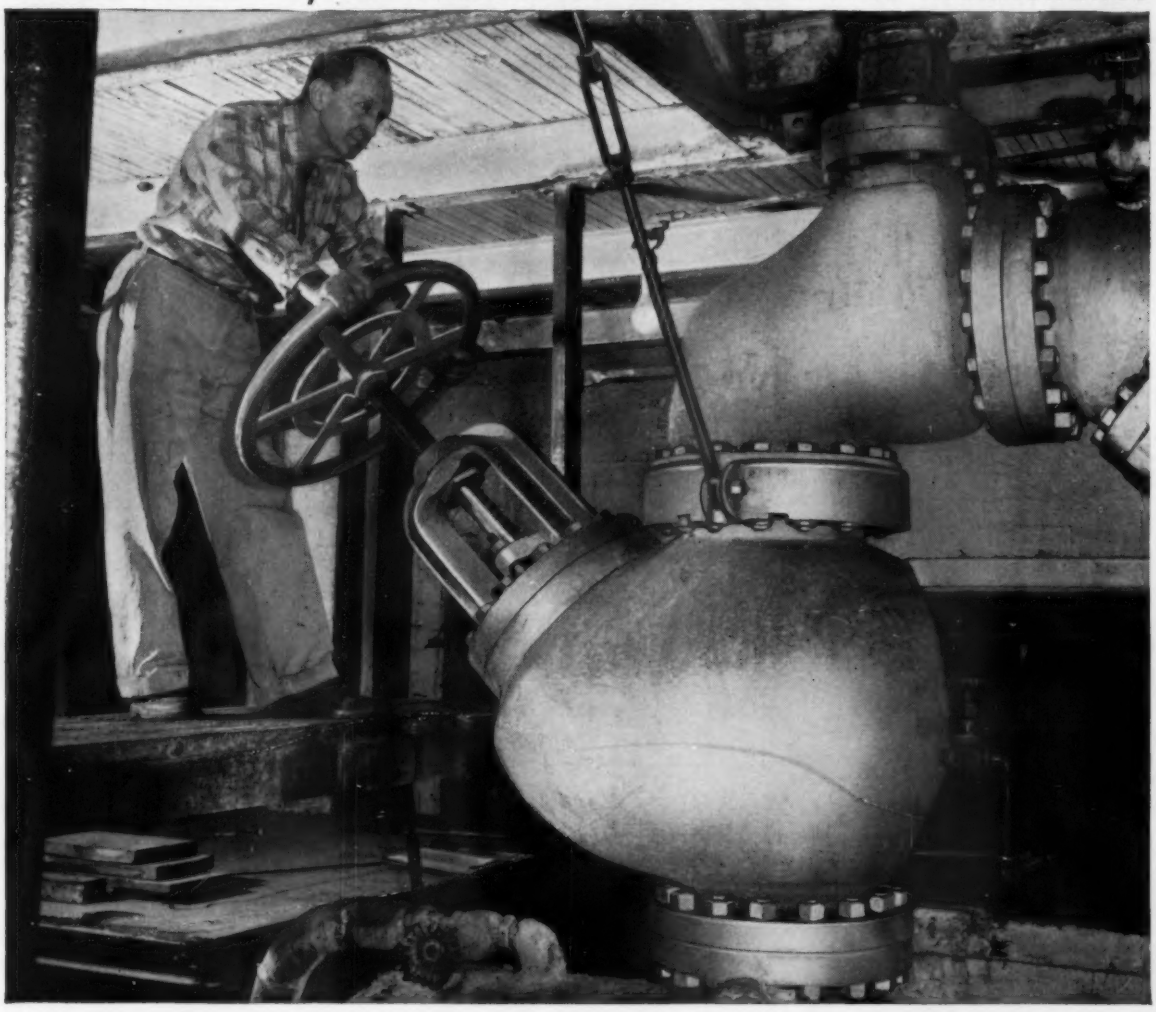
Polycov'r offers a means of outdoor storage of materials and equipment. As shown, a giant tent is readily formed on the storage site from a flexible, polyethylene tube 40 ft in circumference—it can cover a truckload of

material. The black, waterproof material is 6 mil thick and compounded to resist weathering. The tent shown was formed from an 18-ft length weighing 20 lb. It is used in the form of a sleeve or cylinder, tied at the top and secured at the base, if desired. The cost is estimated at less than $25.00. Although developed for temporary storage, Polycov'r is said to offer long service, to be reusable with normal handling, and to retain its flexibility over wide temperature ranges. It is shipped in 100-ft rolls for cutting to lengths required. Or it can be ordered pre-cut. Gering Products, Inc.

7—EMULSION CLEANER for use at room temperature

Mighty-Mulse 563 is described as a general purpose cold solvent emulsion metal cleaner for rapid cleaning of both ferrous and non-ferrous metal parts—at normal room temperature. It is claimed particularly effective on lubricating oil, grease, buffing compounds and general soil found in normal metal working operations. Oils and greases dissolve in the Mighty-Mulse 563 solution, and are emulsified when rinsed in water. Parts with slotted or tapped holes or with irregular openings or

Crane Valves Pay for Themselves in Trouble-Free Maintenance



Beginning another 50 years of cost-free valve service

This remarkable case history proves how the right valve can save money in repairs and maintenance—again and again.

This Crane 10-inch stop-check valve has been in use since 1906 at Seattle Cedar Lumber Mfg. Co., Seattle, Wash. Operating at 360° F. and 150 psi., the valve is closed every third or fourth night when one of 3 boilers is shut down. The valve is also closed every 3 weeks when the boiler is down for inspection and cleaning. About a year ago, this Crane No. 28E Ferrosteel valve was opened for inspection, cleaned up, and put back into service. Repair parts needed? None.

In short, all 50 years have done to this Crane valve is emphasize how rugged and dependable it has proved, and how important it is to use quality valves on every service. For complete information on any valve problem, contact your Crane Representative.

YOU'LL FIND GOOD tips on valves in "Valve Performance Facts"—32 case histories throughout industry. Ask your Crane Man for a copy or write to address below.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

For more facts circle 598 on Reply Card

NEW PRODUCTS

(Begins on page 192)

crevices are cleaned perfectly with this product, says manufacturer. The cleaner is harmless to nose, throat or hands, it is stated; it won't jell, withstands heavy oil contamination and has a pleasant odor. Mighty-Mulse 563 is reported to have a long service life. Fact Sheet EC-563 gives data. Octagon Process, Inc.

8—COMPRESSOR is two-stage, extra capacity unit

According to manufacturer, the ADL-1000 Compressor eliminates need for a second compressor when only slightly larger air capacity is required. The ADL-1000 in a two-stage, air cooled, 20-hp, two-cylinder vertical type. In continuous service, it has a piston displacement of 100 cfm, at 870 rpm, with discharge pressure up to 150 psi. On intermittent service it is reported suitable for discharge pressure as high as 250 psi. Gardner-Denver Co.

9—ELECTRIC DRILL gives impact plus regular action

The Uni-Drill is a selective action ¼-in. electric drill designed to combine regular action and pneumatic type impact action for carbide masonry drilling. Rated at 3 amp industrial for continuous service, the drill takes up to 1-in. carbide masonry drill bits. Drill speed is 2500 rpm; 1700 rpm under load. Weighing only 5¾ lb, the Uni-Drill is handy for scaffold and overhead work, and is said to require a 15-lb pressure to drill at a normal rate. Manufacturer reports that on tests this unit has drilled a ½-in. hole in 3-in. concrete in less than 30 sec.

A selector control on the drill turns to release the internal impact cam, allowing it to float for conventional drill action in wood, steel and similar materials. The drill obtains impact action by means of two cams and a 30-lb pre-loaded spring. Power developed is measured at 90,000 impact lb/min, according to manufacturer. The drill has a standard Jacobs ¼-in. chuck for carbon and high speed bits; adaptors are furnished for carbide masonry drills. Power Tools Corp.

10—GEAR MOTORS offer speed reduction versatility

Developed in anticipation of industry's increasing need for compact and versatile speed reduction, this line of integral horsepower gear motors will be offered in three basic components: an integral-type unit, functionally equivalent to company's previous designs in which gear and drive motor are in a single unit; an all-motor type with drive motor coupled to gear reducer and mounted on a common carrier; and a separate helical speed reducer for use with a variety of prime movers. Mounting dimensions on all three components are identical for similar rating, and parts are interchangeable.

A feature announced is built-in provision for accomplishing ratio changes through a change of pinion and gear in the first stage only. Means for removing and replacing the pinion and gear are designed into each unit. Flexibility of mounting arrangement is also stressed. Gear and bearing alignments are machined into the new line to permit disassembly and reassembly without loss of alignment.

The line will come in three basic types of speed reductions: single reduction offset shaft in speed ranges from 780 to 350 rpm; double reduction concentric shaft, 350 to 37 rpm; and triple reduction concentric shaft, 30 to 13.5 rpm. Integral type gearmotors will be available from 1 to 30 hp. Illustrated, left to right, are a separate helical speed reducer on a wire winding machine; an all-motor gear motor in a foundry; and an integral type for a processing area. General Electric Co.

11—STAINLESS VALVES for liquids down to —300 F

This line of stainless steel gate and globe valves is announced for handling liquid oxygen and other low temperature liquids. The valves, which operate at around —300 F and at pressures of 150 to 600 psi, have extended bonnets to permit use of heavy insulation between the operating mechanism and the pipe line; this is designed to prevent heat pick-up into the valve and its contents and to allow free movement of operating mechanism. They are furnished with Teflon packing, come in ½- to 12-in. sizes. Cooper Alloy Corp.

12—CALKING CARTRIDGE makes a neater job

Stop-Flo is a method of calk control based on a re-designed calk cartridge which incorporates a dome shaped polyethylene button. When compressed by pressure on the gun trigger, this button exerts pressure which forces calk from the nozzle of the cartridge. A twist of the gun plunger rod, when calking is completed, lets the rod be withdrawn and relieves the pressure on the button. The latter snaps back into its original shape, creating suction within the cartridge to pull the calk back. Handi-calk Division.

13—ONE-ARMED FAUCET with flow regulator feature

Along with single handled control, Touch-Flo Faucets have an optional water regulator to limit and increase flow from the spout. A safety feature announced is designed to prevent operator from being burned in turning on the faucet. When it is first opened the flow is cold and as handle is moved along its arc, water becomes warmer. Although it can be started in cold position, instant mixing allows operator to immediately select desired temperature. Strainers are provided to keep impurities and scales out of faucet. Working parts are stainless steel. The Sterling Brass Co.

14—REGULATORS for smooth control of fluid pressure

Uni-Flo Regulators are described as diaphragm-type fluid pressure devices that eliminate plugging, clogging and material build-up. They are designed

You get more waves of carefree power

...with **gould** *batteries*

It isn't just by accident that your Gould Batteries give you extra long service, extra waves of power. That extra life is carefully built into each battery right at the factory. Precise manufacturing techniques have been developed by Gould which assure accurate duplication of construction in cell after cell . . . couple this with Gould's policy of providing regular routine inspection of installations by Gould field engineers and you can see why you get more waves of carefree power with every Gould Battery you buy. Gould-National Batteries, Inc., Trenton 7, N. J.

America's Finest Gould Industrial Truck Battery

More Power to you from Gould

©1957 Gould-National Batteries, Inc.

Always use Gould-National Automobile and Truck Batteries

For more facts circle 599 on Reply Card

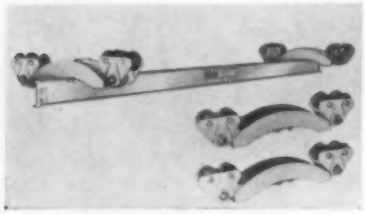
NEW PRODUCTS

(Begins on page 192)

to provide sensitive control of all fluid pressures without surge or variation in fluid supply lines, to permit smooth, regulated flow to spray nozzles. The Mylar polyester diaphragm is impervious to all known solvents, says company, and it separates fluid chamber from control mechanism. Blow-back valve allows flushing without changing pressure setting. Three models control fluid pressures from fractions of a pound to 160 psi. Gray Co., Inc.

15—CRANE KIT contains trolleys, frames, fittings

The Uni-Kit, available for crane assemblies to 4000 lb and spans to 30 ft, contains two truck frames, four crane trolleys and all necessary bolts and fittings. (Crane beam and angle end stops are supplied by the user.) The crane can be assembled with hand



tools, and is specifically designed to meet light duty needs, or to fill temporary and emergency handling requirements where heavy duty equipment is not justified cost-wise or readily available. Trolleys have an adjustable feature permitting use on a wide variety of runway beam sizes. Manufacturer says it can be run on almost any existing crane runway — in some cases on the structural beams of the building. Trolley wheels can be furnished for either tapered or flat-flanged beams. The Becker Crane & Conveyor Co.

16—CLEAR FABRIC keeps areas free of dust, fumes

Herculite F36 Clear is a double lamination of tough vinyl plastic over a mesh of Fortison 36. This lightweight, acid-resistant fabric is said to keep working areas free of dust and fumes, while allowing the penetration of natural light. The translucent material is non-porous yet offering tear resistance, manufacturer states, and it affords protection from the elements. It is also reported to be waterproof, fire resistant, rot proof and mildew proof. Herculite Protective Fabrics.

17—PIPING SYSTEMS for the more difficult fluids

Developed for use in chemical plants, this lined pipe and fittings makes available a corrosion-proof system. The lining is a high density Teflon compound claimed chemically inert at temperatures to 500 F, except for molten alkali metals and fluorine at high temperatures and pressures. Called Fluoroflex-T-S this line of pipe and fittings is designed to handle any and all hot acids including hydrofluoric and aqua regia, and caustics in applications where high temperatures and/or pressures accelerate corrosion ... acid recovery systems, acid treatment of petroleum and coal tar, hot bleaching, pickling solutions. Resistoflex Corp.

18—GREASE is non-flammable and non-melting

No-Flame is a non-flammable grease for use where flame-proof lubrication is necessary, says manufacturer, and it can be used advantageously where temperatures would normally ignite oils and greases. No-Flame is described as a non-melting, water-proof grease having exceptional extreme pressure characteristics. According to company, it can lubricate under high temperatures. Bel-Ray Co., Inc.

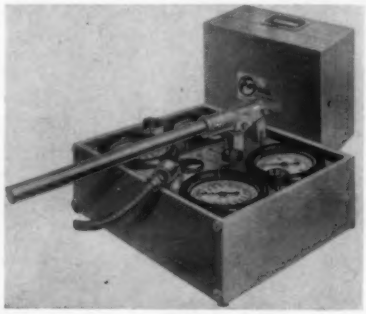
19—TRANSFORMERS mount at point-of-load

This line of three-phase power circuit transformers can be mounted at the point-of-load. Their low noise level of less than 45 decibels suggests their use where quiet operation is desired. It is pointed out that by mounting them at the point-of-load, wiring and labor are reduced. They can be mounted to ceiling, wall, floor—on bottom, top and/or sides. The use of Class B insulation reduces their size and weight, company says, and by eliminating the cover and exposing the core surface, these transformers are safer and easier to clean. Jefferson Electric Co.

Reader Service Cards on pages 277-278 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

20—PORTABLE TESTER for valves, other equipment

This utility version of manufacturer's Porta-Tester weighs only 55 lb and is contained within a carrying case. It is suggested for at-the-site hydrostatic



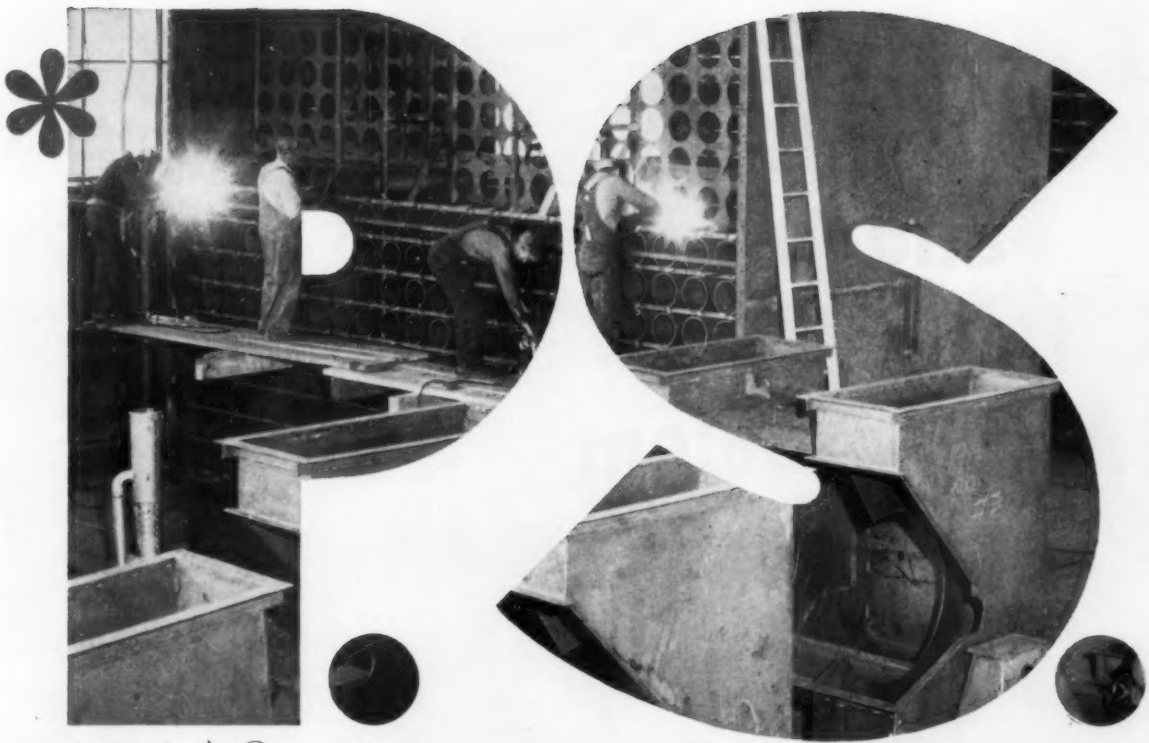
testing of valves, pressure vessels, piping, team generators, pump cases, other process equipment, to pressures up to 3000 psi. The unit is only 18-by-14-by-8 in. and is complete with four gages and 8 ft. of hydraulic, flexible tubing that packages on the rear of the cover. The pump handle folds flat for storage in the case. The unit can be used with water or other hydraulic fluids. Farris Engineering Corp.

21—PLASTIC MATERIAL can repair pipes and tanks

Resiweld Plastic Alloy 600 is offered for permanent repair of pipes, tanks or equipment — for patching small holes or cracks on all metals and most nonmetals. By applying a heavy build-up of this epoxy-based resin, major repair jobs can also be handled, it is stated. Alloy 600 is said to produce a high strength bond that resists shock, water, solvents and most chemicals. Manufacturer says the bond will not shrink, crack, swell or peel, and will hold through temperature variations from —60 to 200 F. Bulletin TTB-5S gives details. H. B. Fuller Co.

22—NON-SLIP COATING for slip-hazard locations

NSC is announcd as a highly developed chemical compound, capable of being sprayed or brushed, as well as rolled, on slip-hazard areas. There's no need for troweling or special preparation, company adds. NSC is compounded of



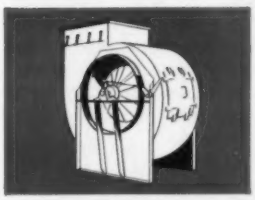
*PROBLEM SOLVERS

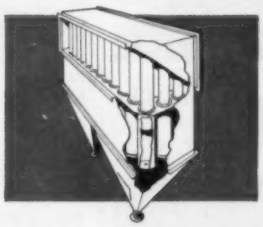
FLY ASH ARRESTOR'S research laboratory, engineering and manufacturing facilities are *totally set up* and especially experienced to provide a "dollar-saving" solution to the most perplexing dust collecting problem. Tell us about your conditions . . . what you want done!

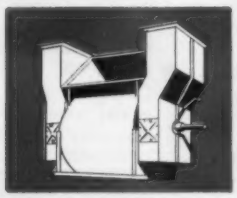
WHIRLEX *dust collecting efficiency begins with "tailored" planning.* Each dust collecting problem . . . whether nuisance elimination or process material recovery . . . gets special study and handling. FLY ASH ARRESTOR engineering solves each problem with a completely integrated, *shop-assembled* WHIRLEX Dust Collector Unit specifically designed and constructed for the job.

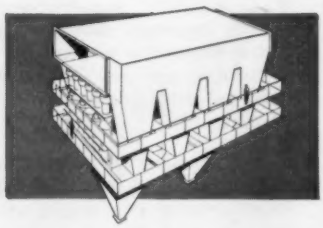
WHIRLEX *heavy-duty* industrial exhaust fans are available to handle any air moving problem. WHIRLEX *standard* forced and induced draft fans are available for boiler applications.

WHIRLEX equipment assures maximum efficiency right from the start . . . and continues to pay off with consistently low operating and maintenance costs.









FLY ASH WHIRLEX ARRESTOR

- CTF Mechanical Gas Centrifuge Collectors • MTSA 9CYT Multiple Cyclone Collectors
- Induced Draft Fans • Forced Draft Fans • Special Duct Work
- Self-Supporting Stacks • Support Structures

Write today for complete engineering data . . .

THE FLY ASH ARRESTOR CORPORATION

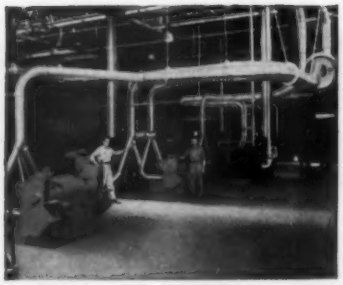
286 North First Street **Birmingham, Alabama**

dust and fumes ... no problem

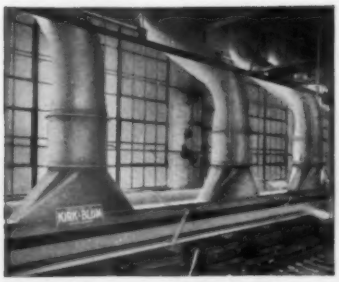
in famous foundries served by

KIRK & BLUM

dust and fume control systems

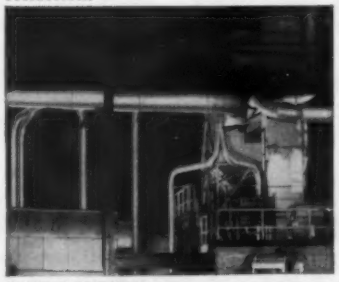


● **GRINDING**
In the chipping and grinding departments, Kirk & Blum systems control dust; dry collection.



● **POURING**
"Moving Floor" pouring station. Forty-foot-long Kirk & Blum hood effectively removes fumes as they are formed.

● **SHAKE-OUT**
Clean air flows over the shake-out grate, removing dust below the operators' breathing level; wet collection.



● **SAND HANDLING**
Equipment is efficiently exhausted by a Kirk & Blum system; wet collection.

When a "dirty" foundry becomes "clean", important differences soon become apparent in worker efficiency, in maintenance and housekeeping costs, and even in plant-community relations.

If dust or fumes are a problem in your foundry, call on Kirk & Blum for the *complete* job—design, fabrication and installation. From 49 years of experience, Kirk & Blum engineers will be able to show you comparable problems efficiently solved the economical way.

For further details and illustrated booklet, write today to: The Kirk & Blum Manufacturing Company, 3189 Forrer Street, Cincinnati 9, Ohio.

For more facts circle 601 on Reply Card

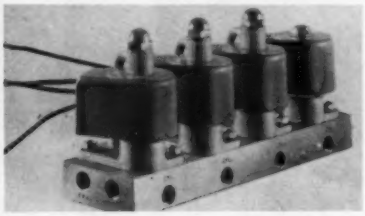
NEW PRODUCTS

(Begins on page 192)

durable plastic resins and polymerized oils with indestructable aluminum oxide granules in constant suspension. These granules and their millions of gripping surfaces are designed to give traction even under oil or grease. Coating is reported to be fire retardant, cleans with ordinary soaps, powders or detergents, and is available in four colors: light gray, dark gray, red and green. Walton-March.

23—SOLENOID VALVES for manifold mounting

Midget two-and three-way solenoid valves, for manifold mounting, are offered to meet demand for grouping a number of solenoid valves on a common body, eliminating separate pipe connections to each valve. Any combination of two-and three-way valves



may be used when operated from a common pressure and return line. Valve solenoids may be controlled individually or in any combination. They have stainless steel cores and soft composition discs for tight closure. Each valve can be removed from manifold body, company says, without disturbing other valves or pipe connections. Valves are suitable for handling air, gas, water, light oil, refrigerants, etc. up to a maximum temperature of 212 F. Pressure range is 0 to 300 psi. The three way valves may be changed from normally closed to normally open operation, or vice versa, by merely revolving valve body 180 deg. Bulletin 8351 gives details. Automatic Switch Co.

24—LIGHTING FIXTURE can add a lamp or a row

Futurliter Fluorescent Fixtures feature the "flexible foot-candle package." According to company, they meet today's lighting standards, yet anticipate tomorrow's greater needs with add-a-lamp—or a row—features. They are adaptable for 100 per cent down lighting, or combination up and down lighting. Futurliters are available with louver diffuser, metal cross baffles with either 35-by-25 deg or 35-by-45 deg lamp shielding, low brightness

INDOORS AND OUT

MORE WESTINGHOUSE MERCURY LAMPS ARE IN SERVICE THAN ALL OTHER BRANDS COMBINED

They're Job-Tailored to give you the most mercury light for your money

From Westinghouse developments like those below, you can see how the built-in quality of Westinghouse Mercury Lamps gives *more light when new, more light throughout life, as well as guaranteed long life.*

- Thorium-Coated Electrodes provide HIGHER LIGHT OUTPUT
- Molybdenum Ribbon Seals assure GREATER DEPENDABILITY, LONGER LIFE
- Hi-Temp Life-Time Bases eliminate INSTALLATION AND SERVICE BREAKAGE
- *Weather Duty® construction with special "hard" glass. Outside installations can't be harmed by snow, sleet or rain even when lamps are installed without protective coverings . . . or inside by fumes, or dripping condensation.*

For recommendations for using the most complete line of mercury lighting—for the right kind of lamp for the job—call your nearest Westinghouse lamp supplier or write: *Westinghouse Lamp Division, Dept. E-9, Bloomfield, N. J.*

B-H18: 700 W. Fluorescent-Mercury Lamp. Color-corrected Golden-White light for general purposes, flood and street lighting. A Westinghouse exclusive!

E-H1: 400 W. Mercury Lamp. Most widely used today. For interior and street lighting. **E-H1-Y:** Built-in clear yellow filter warns of road hazards.

A-H12-WD; A-H15-WD:1,000W. Weather Duty Mercury Lamp. Recommended for all interior application. Widely used by industrial high bay lighting. Weatherproof for heavy duty service.

A-H1-WD: 400 W. Weather Duty Mercury Lamp. Recommended for general purposes, flood and street lighting. Weatherproof for heavy duty service.

P-H1: 400 W. Semi-Reflector Mercury Lamp. Color-corrected golden white for all interior uses. Ideal for areas of high dust concentration.

C-H12-WD; B-H15-WD:1,000W. Weather Duty Fluorescent-Mercury Lamp. Color-corrected golden-white light for general interior and flood lighting. Weatherproof for heavy duty service.

J-H1: 400 W. Fluorescent-Mercury Lamp. Golden-White light is color-corrected for interior and street applications. **J-H1-Y:** Rich, yellow light to identify road hazards, ideal substitute for sodium installations.

YOU CAN BE SURE...IF IT'S Westinghouse

For more facts circle 602 on Reply Card

Here's How Free Daylight Is Saving One Company $58,023.00

SEND FOR YOUR FREE COPY

This lighting cost analysis by an independent consulting engineer reveals the money actually being saved in one metal building through the use of Corrulux daylighting panels in place of artificial lighting. Comparative costs of both methods are projected over a ten-year period, indicating a savings with Corrulux, of over $58,000.00.

Similar savings are possible in your construction picture.

Write for your copy of this important analysis today. **On your letterhead, please.**

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Jamar-Olmen Building
Houston, Texas

For more facts circle 603 on Reply Card

NEW PRODUCTS

(Begins on page 192)

lenses, ribbed Albalite and ribbed Skytex glass bottoms. Units in 4- or 8-ft lengths, rapid start of slimline series may be had. Two micro-justing hangers simplify and speed up pendent type installations; Futurliters may also be close-ceiling mounted. Form 976 gives details. Edwin F. Guth Co.

25—CUTTING OIL for heavy duty machining

Gulfcut Heavy Duty Soluble Oil is an emulsified cutting oil claimed to substantially increase efficiency of many heavy-duty machining and grinding operations. It is formulated to combine cooling ability of water with lubricity and protection of oil. Lower machining costs through longer tool life, heavier cuts and higher speeds and feeds are attributed to it, with benefits applying to all metals, particularly those with low machinability ratings. Chemically-active compounds protect against foaming and welding, company explains, and wetting-out properties are high, providing more effective cooling. Other benefits attributed to this cutting oil, which contains a stable petro-chemical emulsifier, include superior surface finish and greater protection from corrosion. Gulf Oil Co.

26—PACKAGED CO_2 SYSTEMS protect smaller plants

These packaged carbon dioxide fire extinguishing systems come in sizes from 10 to 300 lb of carbon dioxide. The packages contain all components needed to install an automatic system which will protect rooms of 140 to 6000 cu. ft. One or more CO_2 cylinders, rate-of-temperature-rise fire detectors with connector tubing, automatic control and discharge heads with a manual actuating device, discharge nozzles, cylinder supporting frame and instructions are included. Pipe and fittings for each size system, and accessory items, such as remote

LYON QUALITY DESIGN makes THE DIFFERENCE!

LYON benches have amazing strength and rigidity through 3 design features: (1)All-welded construction. (2) Legs and cross members of heavy rolled "T" shapes. (3) Bottom-flared legs.

STEEL WORK BENCHES, for example. At a glance all work benches may look alike but there's a world of difference—in strength, rigidity, stability and smoothness of working surfaces. That's why you should check Lyon before you buy.

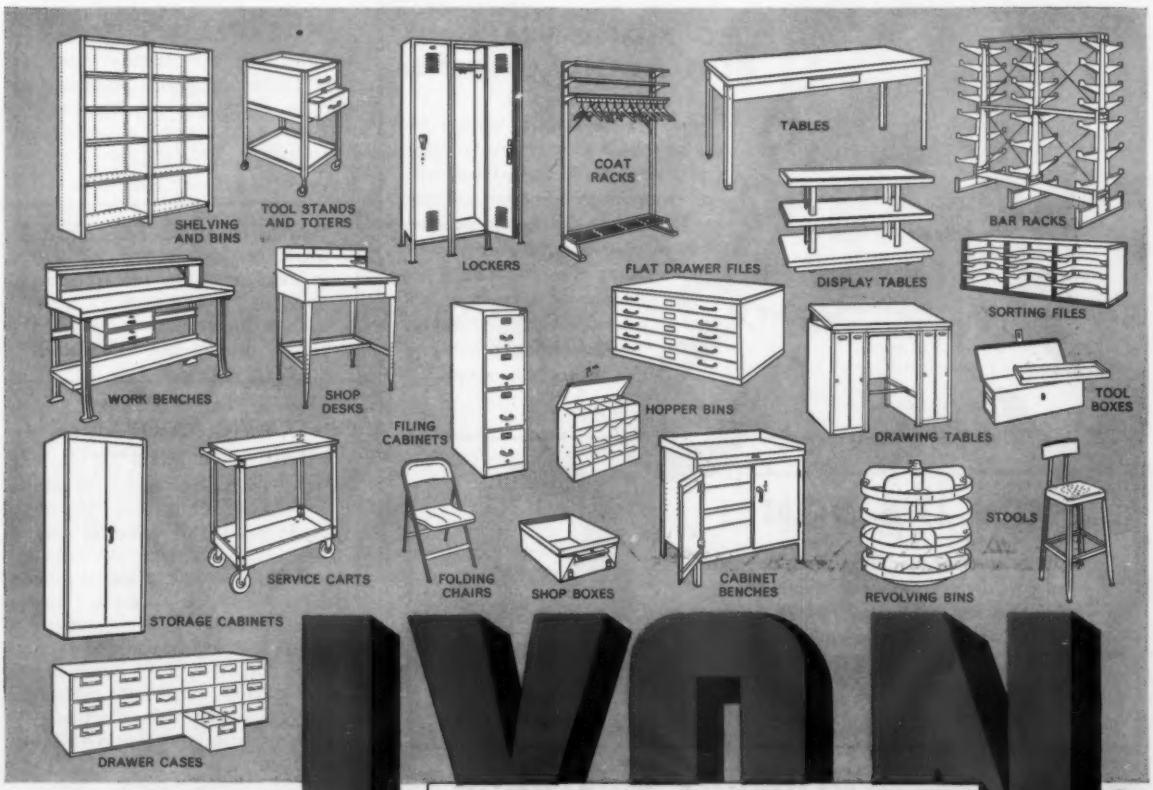
This same quality design makes the difference in every one of the more than 1500 standard Lyon items, a few of which are shown below.

CALL YOUR LYON DEALER. He offers the world's most diversified line of steel equipment. Equally important, he can show you how to get the most for your money in terms of saved time and space.

We can manufacture special items to your specifications.

LYON METAL PRODUCTS, INC.

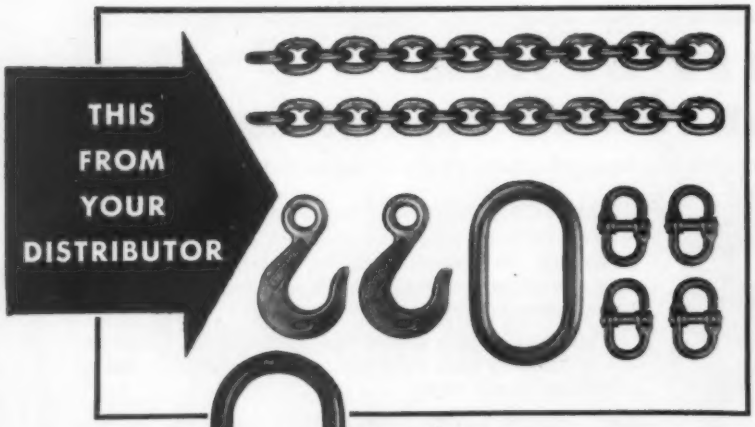
General Offices: 991 Monroe Ave., Aurora, Ill.
Factories in Aurora, Ill. and York, Pa.
Dealers and Branches in All Principal Cities



OVER 1500 ITEMS
for Business, Industry, Institutions

LYON®
STEEL EQUIPMENT

For more facts circle 604 on Reply Card



TO THIS IN YOUR PLANT THE SAME DAY:

NO MORE WAITING FOR SLING CHAINS

Gone are the days of waiting for new or rebuilt sling chains to reach you from the factory. Now, with all components furnished by your Herc-Alloy distributor, you can have your slings the same day. Leading alloy chain users are doing it. Write us or call your CM Chain Distributor for catalog, prices and assembly chart.

HOW IT'S DONE!

With ***Hammerlok*** Coupling Links, anyone who can drive a nail can assemble or rebuild a sling chain in minutes. No peening! No welding! ***Hammerlok*** is rugged ...reusable...safe. Endorsed by leading alloy chain users.

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NERO-ALLOY® HAMMERLOK®

For more facts circle 605 on Reply Card

NEW PRODUCTS

(Begins on page 192)

control pull boxes, can be ordered. These systems are announced for industrial spaces containing normal flammable liquids and enable smaller plants to provide inexpensive automatic fire protection for hazards previously safeguarded by portable equipment. Walter Kidde & Co., Inc.

27—DUST FILTER features design improvements

Design improvements in the AC High Efficiency Design Filter speed field assembly and installation. It is now furnished with both drive and discharge ends pre-assembled and welded before shipment. This encloses both ends except for two 18-by-18 in. inspection doors at top and bottom of cleaning ring drive shaft assembly. The cleaning ring drive shaft is now mounted on a spring loaded, adjustable cast iron bracket. The drive chain has constant tension with tension adjustment. Drive shafts, sprockets and bearings are also assembled and aligned before shipment, and bearings are permanently lubricated type. These filters come in sizes from 500- to 25,000-cfm air handling capacities, or in multiple groupings for larger needs. The Day Co.

Use the Reader Service Cards provided on pages 277-278 to ask for more information on these products. Circle item numbers of products in which you are interested.

28—TRAFFIC PAINT dries fast, and lasts

Romark No. 3 dries within 20 min, it is announced. Containing Parlon, a synthetic resin, this paint is said to provide a tough, opaque film with excellent adhesion to asphalt, macadam, brick and concrete surfaces. Permanence of the stripping is claimed greater than that of similar paints now available. Romark No. 3 comes in yellow and white. At slight additional cost it is available with reflective glass beads for maximum darkness visibility. The Glidden Co.

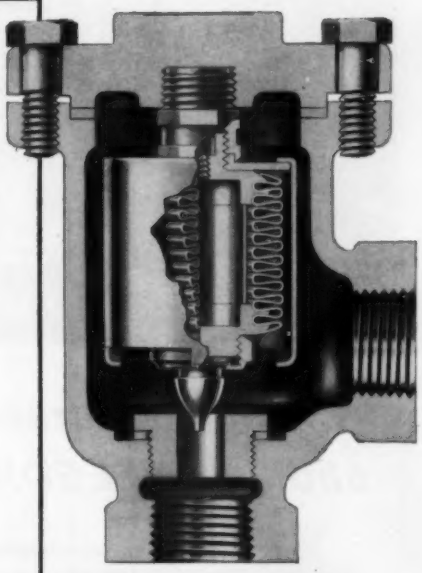
29—GAS REGULATOR for medium light-duty use

The K-G Jeep is a small, moderately priced gas flow regulator designed for medium to light-duty service with most compressed gases. Construction char-

Proven by performance!

All departments agree on operating efficiency of SARCO Thermostatic Steam Trap

	MAINTENANCE	PURCHASING	STORES
1. **Same head and seat for 0-300 psi** — no changing of heads and seats for varying loads and pressures.	✔	✔	✔
2. **Fewer parts to stock** — same bellows, head and seat for 0-300 psi.		✔	✔
3. **Greatest capacity per dollar cost** — 1" size discharges 9,650 lbs/hr at 10°F below steam temperature, 125 psi.		✔	
4. **Very compact and light** — ¾" size fits in palm of the hand. Weighs only 3¾ lbs.	✔		
5. **Freeze-proof**—wide open, self-draining when cold.	✔		
6. **Only one working part** — the thermostatic element. Can be inspected or replaced in few minutes without moving trap from line.	✔		



SARCO

Balanced Pressure

THERMOSTATIC STEAM TRAP

Same seat and head for all pressures to 300 psi

•

Sizes ½" to 2"

•

Write for Bulletin 250

Proven by testing!

Steam-tested — every single Sarco Thermostatic is steam-tested at rated maximum pressure.

Proven "on-the-job" performance — maximum fatigue-resistance for every thermostatic element is assured by Sarco's exclusive helical corrugating process and fatigue testing method.

Quality Control — every step of manufacture under exacting tests and controls . . . in Sarco's own plant.

Proven by experience!

During past 40 years, over 1,000,000 Sarco Thermostatics have been installed in countries throughout the world!

Sarco Company, Inc., Empire State Bldg., New York City

AN AFFILIATE OF SARCOTHERM CONTROLS, INC.

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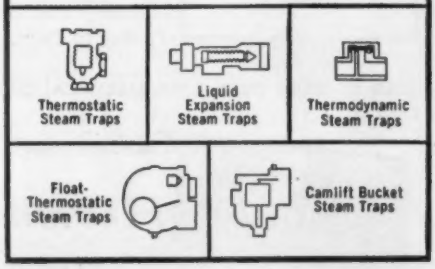
Only Sarco Makes All 5 Types

. . . that's why Sarco can give impartial advice on trap selection



STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

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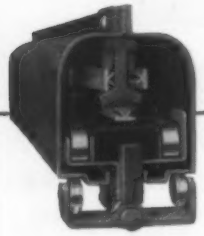
4 EQUALLY GOOD REASONS

...why your cranes and hoists should be FEEDRAIL® powered



Throughout industry, flexible Feedrail systems, in capacities from 60 to 500 amperes, provide convenient movable power sources for:

- Cranes and Hoists
- Production Lines
- Conveyor Assembly Lines
- Moving Test Lines
- Portable Tools
- Machine Tools
- Cutting and Sewing Rooms
- Lighting
- Motor Control

1. Safe electrification. Feedrail conductors are protectively enclosed in steel – no exposed wiring, no trailing cables. You enjoy maximum protection for personnel and equipment.

2. Minimum maintenance. Elimination of frayed, sagging, broken wires means safer, less frequent maintenance.

3. Better materials handling. There are no time consuming traffic holdups with Feedrail. Fewer accidents, less maintenance mean absolutely minimum down time – more efficient materials handling.

4. Lower operating costs. Elimination of hazardous, wasteful working conditions not only leads to better performance but improves safety records and plant morale as well – eventually lowers insurance costs too.

A Feedrail "moving power system" will fit your crane or hoist's needs – can be installed quickly and easily. Get full information. Write today to Dept. P9.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

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ELECTRIC FEEDRAIL®

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

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SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

For more Facts circle 607 on Reply Card

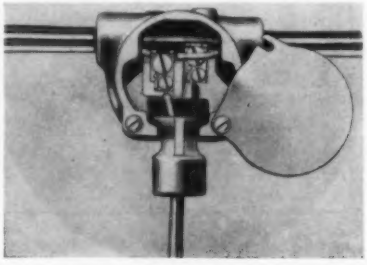
NEW PRODUCTS

(Begins on page 192)

acteristics of company's heavy duty regulators are embodied in the new model, it is announced. The clear anodized body and back cap are of forged aluminum with a tensile strength given as 68,000 psi. Stainless steel is used for the filter and internal working parts. High pressure gages are graduated to 4000 psig, adding a 1000-lb safety factor, company notes. With only two replaceable parts, most common internal repairs can be handled in the field, and without special tools. K-G Equipment Co., Inc.

30—LOW COST CONDULET is easily installed

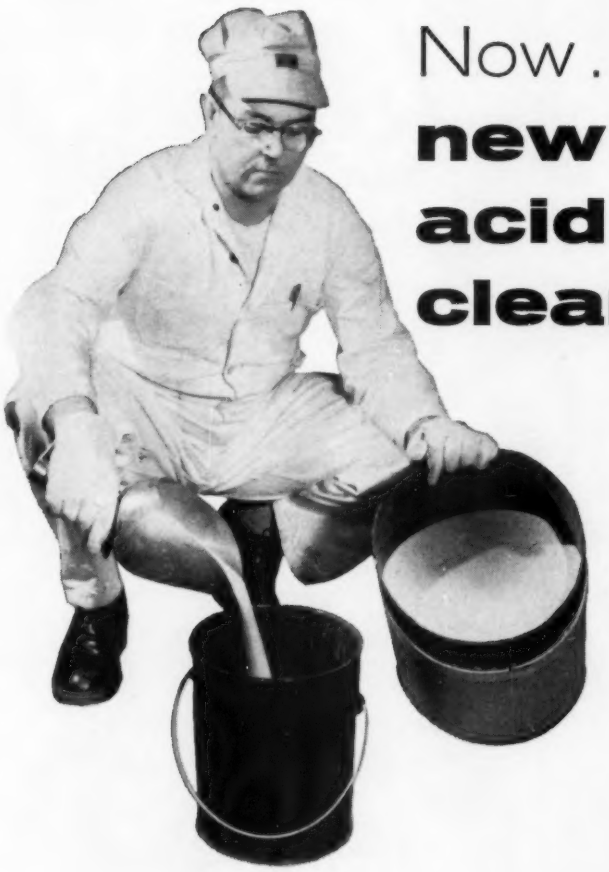
This low cost lighting fixture hanger condulet, the Series AL, is a casting which need not be attached to or supported by the ceiling. It is fastened by conduit and conduit straps. Manufacturer points out that several condulets, with their connecting conduits, may be assembled on the floor, raised to the



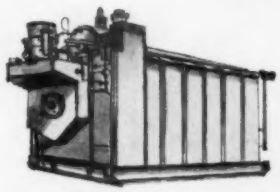
ceiling as a unit, and quickly fastened by conduit straps which have been previously placed. Since fixture and bail nipple are wired first, the fixture is hung simply by placing the ball of the hanger in the bottom recess of the condulet, which supports the weight of the fixture, and has space for splicing fixture wires to circuit conductors. The cover is swung aside to exposed the wiring space by merely loosening a screw. It is claimed that on a concrete ceiling, installation with this condulet costs 10 per cent less than with outlet box, 30 per cent less on a steel beam ceiling. Crouse Hinds Co.

31—PACKAGED SYSTEM controls process variables

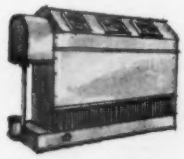
The Cash Standard-Sparton Series 300 Packaged Control System is introduced for remote positioning of cone, butterfly, plug and ball valves; sliding stem valves; variable speed mechanisms, and other final control elements. It is designed to control pressure, flow, surge, liquid level, proportioning, speed and other vari-



Now. **new acid cleaners**



Steam Boilers, Condensers, Heat Exchangers, Piping



Air Conditioning Cooling Towers, Ice-Making Machines, Evaporating Condensers

Food-Processing Vessels, Pipelines, Gelatin Evaporators

Marine Salt-Water Evaporators and Heat Exchangers

in **dry** easy-to-handle form

Cleaners based on Du Pont Sulfamic Acid are safer, more convenient, non-fuming . . . dissolve in water to form effective, low-corrosive solutions

Now . . . acid cleaners you handle *dry!* No fumes or hazardous liquid spillage to worry about. When mixed with water, these cleaners have all the penetrating power of hydrochloric acid with far less corrosive effect. The key to these unusual properties is a remarkable new ingredient — Du Pont Sulfamic Acid.

Sulfamic acid-based cleaners remove scale and deposits from air conditioning and ice-making equipment; food-processing vessels; steam boilers; milk evaporators and pasteurizers; marine evaporators and heat exchangers. Cleaning action is fast, thorough. Downtime is eliminated in many cases because cleaners are added while equipment is in operation.

We'll gladly send you additional information on sulfamic acid-based cleaners and the names of formulators who offer these new compounds. Just mail the coupon below.

DU PONT
SULFAMIC ACID

DUPONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Room N-2533
Wilmington 98, Delaware

Please send me ☐ sulfamic acid general equipment cleaning bulletin; ☐ names of formulators offering cleaners based on sulfamic acid.

*Name*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

For more facts circle 608 on Reply Card

—provide
"trouble-free"
clean liquids

That's why Elliott Twin Strainers are so widely used by power plants and industry. They protect expensive liquid-handling equipment by straining liquids—without interrupting the flow. Shifting the flow from one strainer basket to another is accomplished easily by turning two valve wheels. Removing and dumping the strainer basket is simple. The result: the chance of objectionable solids gumming-up the works is eliminated.

The Elliott line of strainers also includes Single, and Self-Cleaning Strainers in sizes ranging from 1″ to 24″, and with straining perforations from 3/8″ down to fine wire mesh. For further details contact your local Elliott District Office or write Elliott Company, Jeannette, Pa.

A7-2

ELLIOTT Company

STEAM TURBINES • MOTORS • GENERATORS • DEAERATING HEATERS • EJECTORS • CONDENSERS • CENTRIFUGAL COMPRESSORS • TURBOCHARGERS • TUBE CLEANERS • STRAINERS

For more facts circle 609 on Reply Card

NEW PRODUCTS

(Begins on page 192)

ables at distances up to miles, with one operator at a central location. The system, which is reported to combine response speed of electronics with the smoothness of pneumatics and hydraulics, utilizes a power supply, positioner, reducing valves and booster valve as standard components in a compact package which receives signals from the remotely located supervisory control unit via telegraph, telephone or private wires, or microwave transmission. A. W. Cash Co.

32—PAINT ROLLER for use on the pipes and poles

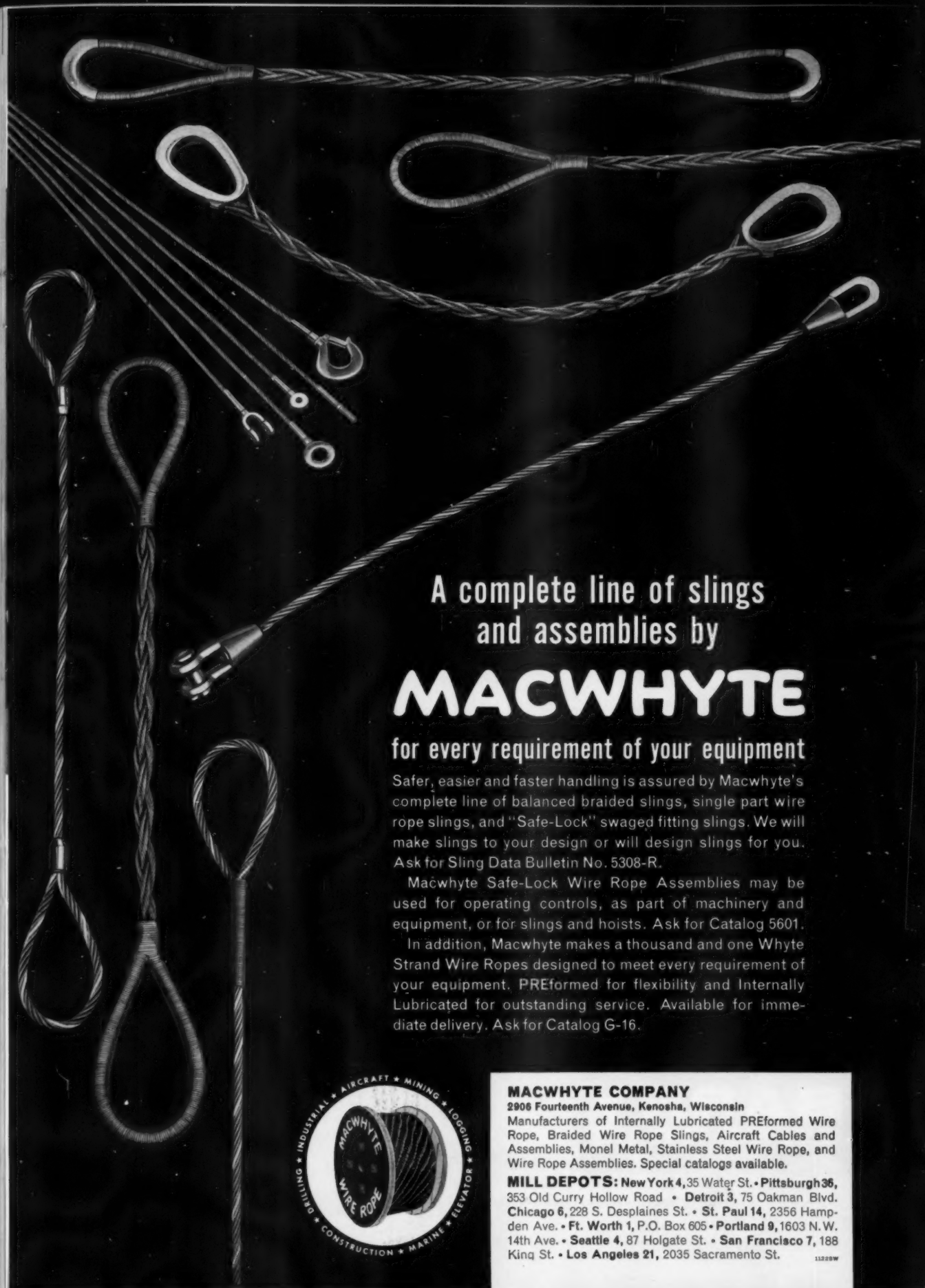
The E Z Pipe Paintr literally wraps itself around pipes and other cylindrical objects, says manufacturer. It consists of five separate paint rollers operating on a spring. When the

slight hand pressure is released, the roller returns to its original starting shape for easy loading in a paint tray. The roller handle adjusts to any position on the U-frame for ease in covering hard-to-reach areas, and the handle is threaded for use with an extension pole. The E Z Paintr costs around $8.00, including covers. (Company also produces a smaller-sized model, with two 1-in. covers, for use on smaller pipes; it costs around $3.00.) E Z Paintr Corp.

33—RAIL CONTACTOR is easily installed

Silec Rail Contactors are designed to operate crossing lights, warn that cars are backing into siding, detect motion and/or direction of train, and operate automatic switches. They are available for single arm or double arm operation. These contactors are installed on a special base attached to the rail, it is pointed out, complicated adjustments aren't required. The rail clamp is designed to fit any size or weight of rail. According to the company, the contactor's operation is not affected by

For more facts circle 610 on Reply Card →



A complete line of slings and assemblies by

MACWHYTE

for every requirement of your equipment

Safer, easier and faster handling is assured by Macwhyte's complete line of balanced braided slings, single part wire rope slings, and "Safe-Lock" swaged fitting slings. We will make slings to your design or will design slings for you. Ask for Sling Data Bulletin No. 5308-R.

Macwhyte Safe-Lock Wire Rope Assemblies may be used for operating controls, as part of machinery and equipment, or for slings and hoists. Ask for Catalog 5601.

In addition, Macwhyte makes a thousand and one Whyte Strand Wire Ropes designed to meet every requirement of your equipment. PREformed for flexibility and Internally Lubricated for outstanding service. Available for immediate delivery. Ask for Catalog G-16.

DRILLING ★ INDUSTRIAL ★ AIRCRAFT ★ MINING ★ LOGGING ★ ELEVATOR ★ CONSTRUCTION ★ MARINE ★

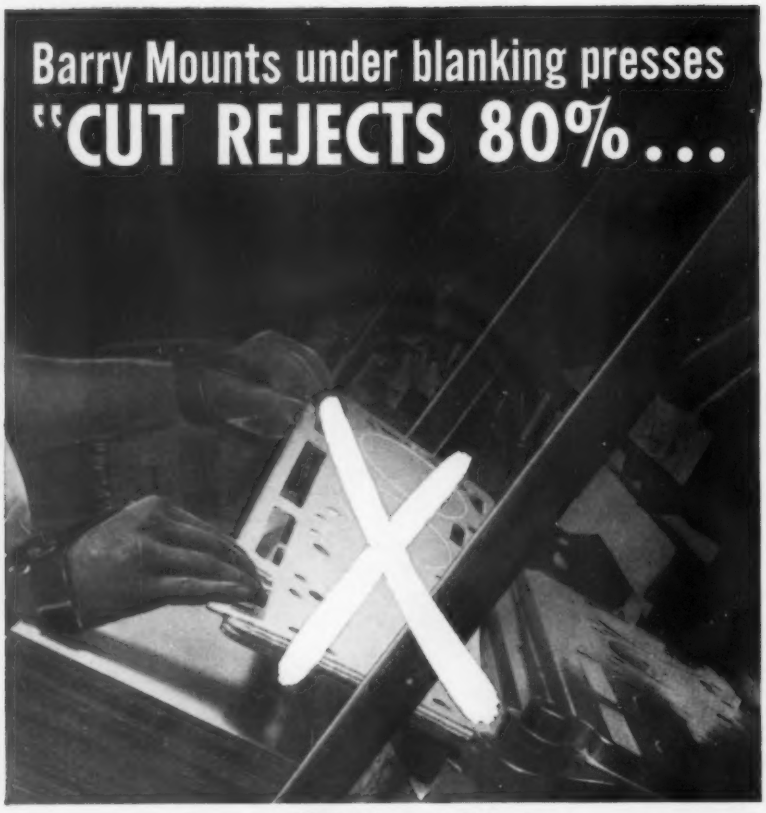
MACWHYTE WIRE ROPE

MACWHYTE COMPANY
2906 Fourteenth Avenue, Kenosha, Wisconsin
Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope, and Wire Rope Assemblies. Special catalogs available.

MILL DEPOTS: **New York 4,** 35 Water St. • **Pittsburgh 36,** 353 Old Curry Hollow Road • **Detroit 3,** 75 Oakman Blvd. **Chicago 6,** 228 S. Desplaines St. • **St. Paul 14,** 2356 Hampden Ave. • **Ft. Worth 1,** P.O. Box 605 • **Portland 9,** 1603 N.W. 14th Ave. • **Seattle 4,** 87 Holgate St. • **San Francisco 7,** 188 King St. • **Los Angeles 21,** 2035 Sacramento St.

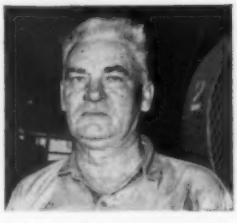
11228W

Barry Mounts under blanking presses "CUT REJECTS 80%...



Save 50% of Maintenance"

says Hi Turner,
Maintenance Supt.
FELT PRODUCTS
MFG. COMPANY
Chicago



Hi Turner faced a double problem — how to get more output from blanking presses, and how to get maximum production for one of the most productive plants in the highly competitive automotive-parts field.

Rejects were running too high. And production time was being lost while maintenance men were continually having to tighten die clamps and lag bolts, and replace broken bolts, tie rods, and even cracked press legs.

Now, with the blanking presses "floating" on Barry Machine Mounts that reduce shock and the stresses induced by lagging machines to the floor,

- ***rejections are cut 80%***
- ***maintenance costs are cut in half***
- ***useful production time per press is increased considerably.***

And that isn't all! Presses "free-floating" on Barry Mounts can be *relocated in minutes*. Fifteen minutes after a machine is moved in, it is ready to start producing — a saving of 7½ man-hours.

YOU CAN GET SAVINGS LIKE THESE IN YOUR PLANT

A file of "Facts-and-figures Reports" tells you how production and maintenance costs are being cut in large and small plants. Even better, a sample installation will prove the savings *in your own plant*. Write now for details.

BARRY CONTROLS INCORPORATED

BARRY B MOUNT
SOLD THROUGH INDUSTRIAL DISTRIBUTORS

910 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS

For more facts circle 611 on Reply Card

NEW PRODUCTS

(Begins on page 192)

low joints or sagging track. An oil dashpot serves to assure an open or closed circuit time of several seconds and avoids unnecessary impact by train wheels, and a shock absorber is provided to stop vibration effects caused by approaching train. Femco, Inc.

34—REPAIR KIT mends the tanks, pipes and pumps

Based on Plastic Steel, this repair kit is for on-the-spot repairs of equipment and machinery. Plastic Steel, a combination of 80 per cent steel and 20 per cent plastic, can be formed into any shape and will not run or sag when applied to a vertical service, manufacturer states, and 2 hr after application it becomes a strong, rigid

metallic piece. Heat or pressure are not required. It is claimed durable, permanent, essentially non-shrinking or expanding. Plastic Steel does not depend on evaporation for hardening and will even harden under water, it is announced.

While Plastic Steel is strong enough by itself for most repairs, the kit includes treated glass tape for use as a "bandage" if large holes or corroded areas are present. Laminations of the tape and Plastic Steel are reported to have a compression strength of over 50,000 psi, a tensile strength of over 45,000 psi. Each kit contains 1 lb of Plastic Steel, hardening and release agents, rubber-covered steel patch, glass tape, measuring spoons and directions for use. It costs around $3.25. Devcon Corp.

35—PRODUCTION SPRAYER accuracy of application

Designed for applying Micro-Moly—a molybdenum disulfide lubricant—this production sprayer is said to assure accuracy of application as well as minimum product waste. The lubricant is packaged in a self-pressurized 5-gal container complete with spray gun and 9 ft of hose. The volatile carrier of this dry film lubricant is non-toxic, non-flammable and non-cor-

For more facts circle 612 on Reply Card ⟶

RCA SAVES 4 WAYS with WEBB Conveyors...

This Webb conveyor installation, processing RCA Colorama TV picture tubes, is a perfect example of what can be accomplished with modern conveying techniques. In addition to the obvious economies realized with mechanized materials movement, these five conveyors, totaling 2385 feet, have provided RCA with four important benefits:

1. **Save Production Time** . . . conveyors dip down at every work station to an efficient work level, bringing the material to the worker . . . minimizing manual handling.
2. **Paced Production Flow** . . . conveyors carry materials to each operation at a predetermined rate, aiding in control of production rate.
3. **Overhead Live Storage** . . . stock-piling on floors eliminated, providing greater productive area and increasing production potential of the plant.
4. **Greater Employee Safety** . . . cleaner, uncluttered work areas because materials travel and are stored overhead.

Your plant can realize these same benefits, and others as well, with modern conveyorization techniques. For more information, or for engineering service, write or call Webb today.

More Details on Reverse Side

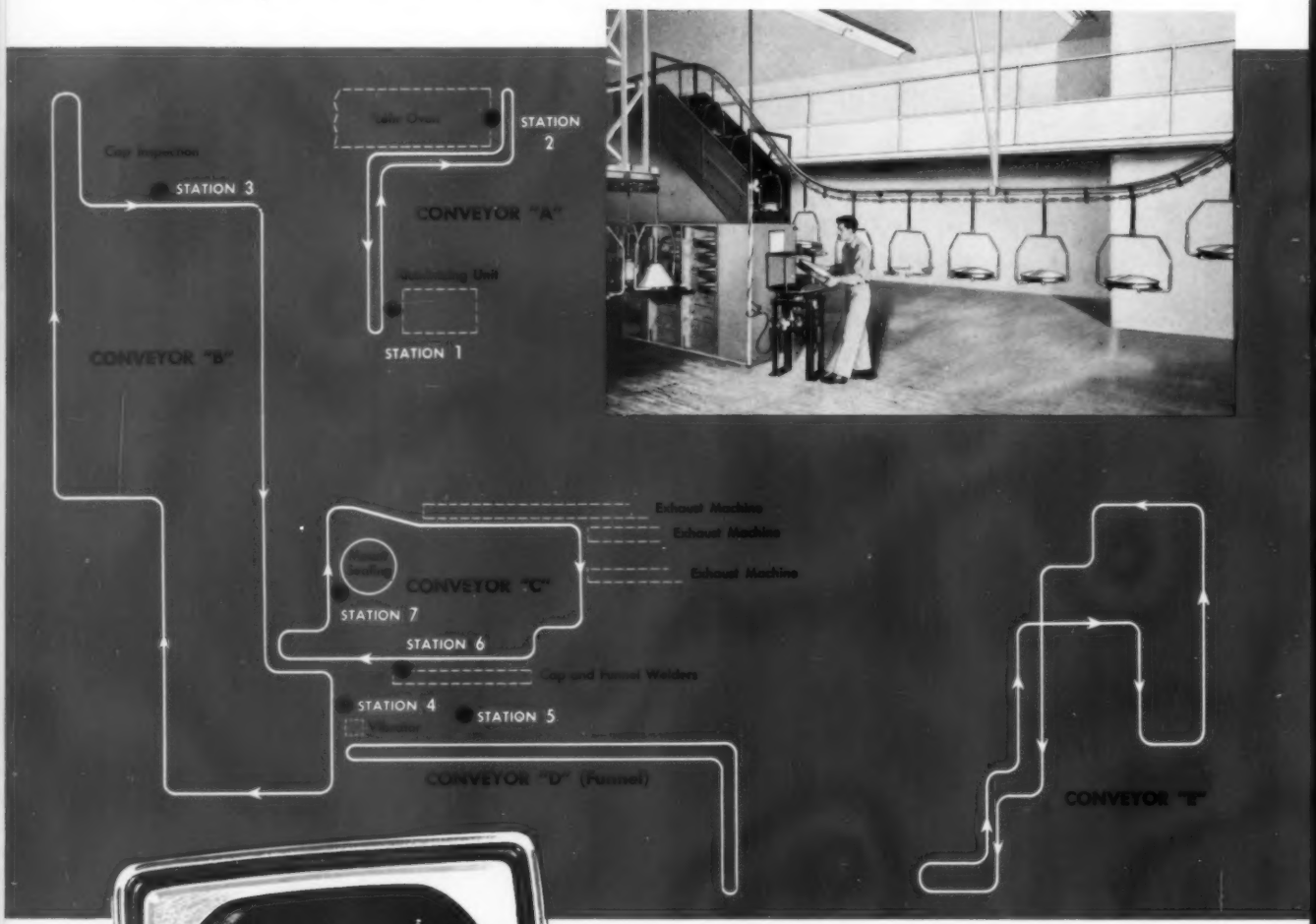
JERVIS B. WEBB COMPANY

SPECIALISTS IN CUSTOM CONVEYOR SYSTEMS

8933 ALPINE AVENUE • DETROIT 4, MICHIGAN

FACTORIES: DETROIT • LOS ANGELES • ATLANTA • HAMILTON, ONTARIO, CANADA • ENGLAND • FRANCE • BELGIUM • AUSTRALIA

Webb Conveyors at RCA . . .



a picture of PRODUCTION EFFICIENCY

At the start of the RCA Colorama TV picture tube processing and assembly operations, the cap assemblies are taken from the aluminizing unit and placed on Webb trolley conveyor "A" at station 1. This conveyor transports the caps automatically to station 2 where they are removed and placed in a Lehr bake-out oven. After traveling through the oven, caps are inspected and placed on conveyor "B" at station 3.

The caps are then automatically carried overhead to station 4 where they are placed on a vibrator (see photo above) before being welded to funnel assemblies at station 5. Funnel assemblies are processed along the route of conveyor "D". After welding, the assemblies are placed on conveyor "C" at station 6 and carried to the mount sealing machine at station 7. This machine automatically seals the electron gun in the bulb. Several assemblies at one time rotate merry-go-round fashion in the sealing machine fixture.

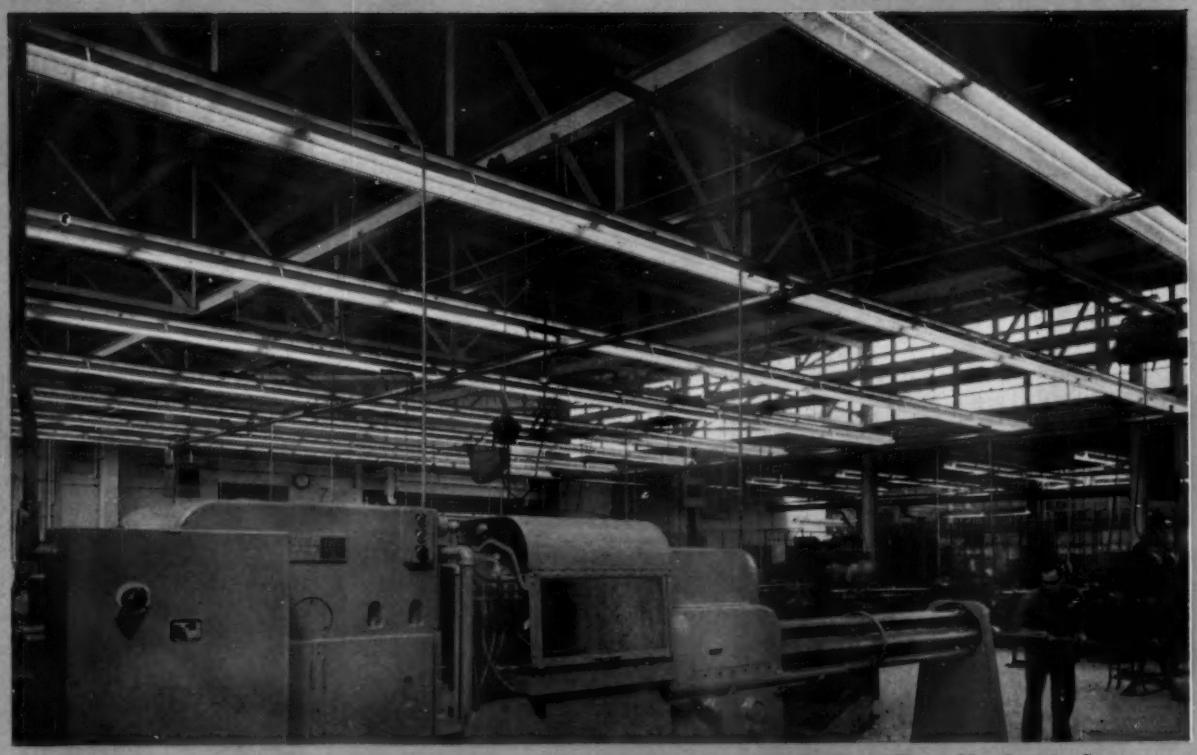
Tube assemblies are again placed on conveyor "C" and conveyed to the straight line exhaust machines. Following the exhaust operation, tubes are based, aged and tested. Any tubes that fail to meet the RCA quality standards are sent to salvage on conveyor "E". The salvage conveyor carries rejects through several reclaiming operations .

Throughout the RCA plant, conveyors dip down at each work station to make materials available at a convenient height and location. Between stations, conveyors automatically carry materials overhead . . . keeping aisles clear, assuring maximum productive floor area. Each of the five conveyors carry a recirculating inventory of parts, thus keeping parts storage overhead.

The Jervis B. Webb Company manufactures all types of conveyors . . . from simple straight line units to complex systems. Webb conveyors can be designed to carry all types of materials . . . from toothpicks to logs, from raw metal to 40,000 lb. tractors. Whatever your materials, a Webb conveyor can convey them . . . at lower production cost, with greater production efficiency and with more effective production control.

If your problem is modernizing production flow . . . call a Webb Engineer

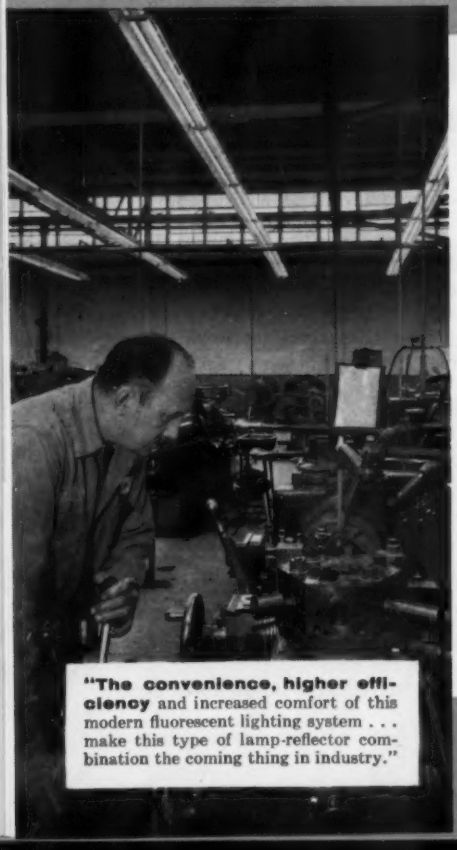
JERVIS B. WEBB COMPANY
SPECIALISTS IN CUSTOM CONVEYOR SYSTEMS
DETROIT 4, MICHIGAN



New over-all plant illumination at Hansen Manufacturing Company uses Sylvania Diamond-"I" fixtures, eliminates need for supplementary lighting.

How they get around the high cost of supplementary lighting

. . . at Hansen Manufacturing Company



"The convenience, higher efficiency and increased comfort of this modern fluorescent lighting system . . . make this type of lamp-reflector combination the coming thing in industry."

Hansen Manufacturing Company (Cleveland, Ohio), precision manufacturers of quick-connective fluid couplings for industry, learned from experience: "*Special lighting fixtures cost money to operate and maintain, and get in the way, at work locations.*"

So Hansen did away with supplementary lighting—even in precision-work areas—by installing Sylvania Diamond-"I" fixtures throughout their new plant addition. These slotted semi-direct units have a full 25% upward light component. This builds illumination efficiency up to an extremely high 89%, gives the high foot-candle levels needed. It softens harsh overhead contrasts, and shadow and glare spots, at "*see*" level.

Ultimate in Lighting Design

Except in a few spots where overhead shielding interferes, *the higher light ratios at machine level eliminate need for supplementary lighting fixtures.* Fine printing on micrometers is clearly visible. Breaks caused by metal failures can be spotted promptly, often saving expensive tools.

William B. Ferguson, consulting electrical engineer on the job, reports, "The 25% uplight provided is considered the ultimate in design, alleviating a great deal of discomfort."

Valuable Data for You

Our advice: Don't buy plant lighting until you know about all its physical characteristics—quantity, quality, brightness ratios, shadow, glare, maintenance factors, efficiency, etc. Our new 24-page book, *Prescribed Lighting Protects the Eyes of Industry*, gives you the data you need—simply, quickly. Write today for your *free* copy.

Sylvania Electric Products Inc.
Dept. J-3, Lighting Fixtures
One 48th Street, Wheeling, W. Va.

SYLVANIA

. . . fastest growing name in sight

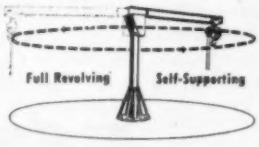
LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

For more facts circle 613 on Reply Card

1 LOW-COST JIB CRANE SERVES A 550 SQ. FT. AREA

This 'Load Lifter' Jib Crane is designed to handle lifting jobs where no crane service exists and where it saves to free the overhead crane for other work. It bolts to the floor — supports itself — takes only 6½ sq. ft. of floor space, yet can serve an area up to 550 sq. ft.

The 'Load Lifter' Jib Crane provides low-cost, efficient lifting at machine tools, on small assembly floors, molding bays, degreasers, dipping tanks, and loading platforms. The jib always swings smoothly and easily. Capacities: ¼ to 2 tons. You can equip the jib with an economical 'Budgit' Electric Hoist or 'Budgit' Chain Block, or any other hoist of proper capacity. Ask your "Shaw-Box" Distributor for details or write us for Bulletin 383.



56 H-1R

'Load Lifter'® JIB CRANES

MANNING, MAXWELL & MOORE, INC.
SHAW-BOX CRANE & HOIST DIVISION
362 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.

For more facts circle 614 on Reply Card

NEW PRODUCTS

(Begins on page 192)

rosive, company says, especially blended for applying a controlled quantity to metal surfaces. Gun has long nozzle for ease in reaching difficult locations, and trigger action is adjustable to govern rate of discharge and spray pattern. Tower Oil Co.

36—PILOT VALVE converts cylinder to positioner

This remote positioner is reported low in cost and designed to convert any high grade commercial cylinder to a double-acting power positioner. It converts input air signals to pneumatic or hydraulic signals up to 150 psig for actuating power pistons, diaphragm motors and rotary vanes. Standard input signal range is 0 to 30 psig. Manufacturer says the compact positioner is particularly adaptable for use with power pistons since it lets user choose the most desirable power cylinder from the standpoint of bore, stroke and style of mounting. A conventional application noted is the positioning of large butterfly valves in response to signals from a remote control point. Hagan Chemicals and Controls, Inc.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 277-278. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

37—LOAD CONTROL is an electro-mechanical device

Reported unusual in its combination of accuracy, continual indication of motor load, and adjustable load limits, the Load Sentry is designed for use wherever an overload may be registered on an electric motor. An electro-mechanical control, it is built around the positive action of a contact meter-relay and has no electron tubes. It is readily hooked into "start-stop" switches. Maximum load to be permitted on the motor being monitored is set by a pointer on the dial of the meter-relay. This dial has 30 divisions from 0 to 150 per cent of normal load. Another pointer indicates actual runing load on the motor. When pointers meet at an overload position, contacts lock and the circuit is broken, company explains; the Load Sentry will then sound an alarm and/or shut down the system.

Safety features of the Load Sentry

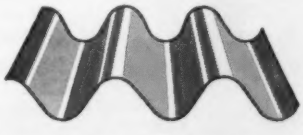
FIVE OPEN-HEARTH OVENS CAN'T COOK THIS ALCOA ALUMINUM ROOF!

Intense heat, searing gases and fumes have failed to faze this Alcoa® Aluminum Corrugated Roof. The roof remains as strong and useful as the day it went up! And no maintenance has been necessary.

Equally important from the maintenance standpoint, this Alcoa Roof went up fast at amazingly low cost per square foot.

The practicality and economy of Alcoa Industrial Building Products for plant maintenance and expansion are worth knowing about. Corrugated and V-beam roofing and siding, and ribbed siding sheet—even corrugated sheet for conveyors—are but a few of the tested and proved low-cost, maintenance-free ways to improve your plant.

Your nearest Alcoa sales office will gladly furnish complete information and put you in touch with an Alcoa Approved Applicator if you wish. Or write: Aluminum Company of America, 858-J Alcoa Building, Pittsburgh 19, Pa.



FREE SAMPLE

In fact, your choice of two samples! Alcoa has a limited supply of samples of (1) Corrugated Sheet and (2) Embossed Corrugated Sheet. Make your choice and send for this remarkable material today!

NEW!
"ALCOA THEATRE"
Exciting Adventure
ALTERNATE MONDAY EVENINGS

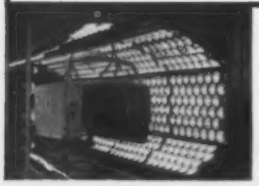
ALCOA ALUMINUM
INDUSTRIAL BUILDING PRODUCTS
ALUMINUM COMPANY OF AMERICA

For more facts circle 615 on Reply Card

Your Guide to the Best in Aluminum Value

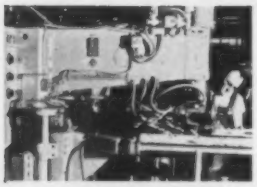
GENERAL ELECTRIC

VOLTAGE REGULATION PHOTO QUIZ



QUESTION:
In infrared drying ovens, what causes scorching or lengthens baking cycle while shortening lamp life?

ANSWER:
"Bad Voltage"—over or under lamp rating.



QUESTION:
In electronically controlled machines, what causes excessive rejects, down-time and high maintenance costs?

ANSWER:
"Bad Voltage"—over or under nameplate rating.

QUESTION:
What makes electroplating equipment produce poor plate quality, high rejects?

ANSWER:
"Bad Voltage"—over or under nameplate rating.

QUESTION:
What causes electronic computers to give wrong answers, requiring costly down-time and high maintenance?

ANSWER:
"Bad Voltage"—over or under nameplate rating.

QUESTION:
What is the most economical way to eliminate bad voltage?

ANSWER:
An Inductrol* Voltage Regulator, which precisely controls either a-c or d-c voltages. Three types available: motor-operated, hand-operated, automatic (shown left). Has excellent space factor, easy to install, neither affects nor is affected by system power factor. Since it is an induction regulator, it has no brushes, needs essentially no maintenance. Highly reliable.

FOR MORE INFORMATION contact your G-E apparatus representative, or write Section 425-9, General Electric Co., Schenectady 5, N. Y.

*Trademark of General Electric Company for Induction Voltage Regulators.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 616 on Reply Card

NEW PRODUCTS

(Begins on page 192)

include an interlock that keeps the circuit broken after an overload until the cause for trouble has been corrected and a manual reset button pressed to restart the motor. Another feature announced is "fail-safe" circuitry. The load relay is energized when the control is operating. Overload causes the relay to drop out and break the circuit through the motor. Other abnormal conditions will also short out the load relay, it is pointed out. Assembly Products, Inc.

38—SAFETY SIGNS glow in the darkness

Because of the phosphorescent pigment used, a short exposure to light—daylight or artificial—makes Safety Glo-Signs glow visibly for hours, company announces. Should any area be

plunged into sudden darkness, they become brightly visible. The signs are made on heavy, waterproof, pressure-sensitized paper with adhesive back. Indoors they last indefinitely, it is claimed; outdoors, in a semi-protected area and covered with a suitable weatherproof coating, they should last a year. A variety of commonly used signs—with characters in fire red on an off-white ground—are available. Some are shown. M-M-A, Inc.

39—PORTABLE PUMP, high-pressure hydraulic unit

The 798-AC-SA Power Pump, driven by a ¾-hp, 115-230 v electric motor, is introduced for a variety of hydraulic power applications, including benders for pipe and conduit. Under finger-tip control at all times, the pump is reported to operate a hydraulic ram or jack three to five times faster than a hand pump. Featuring a fast-approach, two-speed action, the pump will, as the ram load increases, automatically change over to high pressure, manufacturer explains. Easy operation is stressed.

Three-position control—advance, neutral, and return—is provided, with neutral holding the ram pressure and position while the motor is running. Valving provides high-pressure advance only and allows spring action, manual or gravity return of the ram.

6,000 horsepower in a single CLARK CBA-8 balanced/opposed compressor

Now, for the really big applications, Clark introduces the most powerful compressor ever built—the new CBA-8. The ability to handle tremendous horsepower, however, is not the only feature of this new compressor. Being extra heavy and rugged in all respects, it is the perfect choice for those services where extremely high pressures are required such as in the process industries and for high pressure wind tunnel applications.

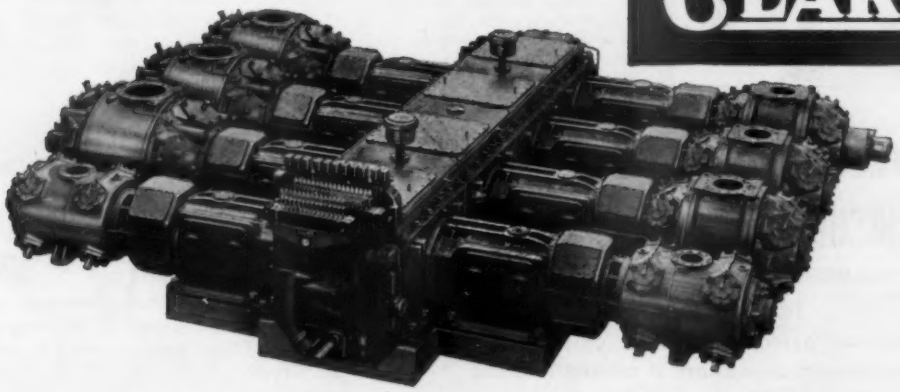
High discharge pressure invariably causes a high pressure rise across the cylinders which results in heavy pin loads. The new CBA-8 is designed to carry pin loads of 100,000 pounds with ease. For large air compressor installations, at normal pressures, the CBA-8 will operate with minimum maintenance because of its heavy construction. The balanced/opposed design principle, originated by Clark, assures vibrationless operation.

Two new CBA-8 units already have been delivered for a special application. Your Clark representative will gladly give you full details on this new unit.

CLARK BROS. CO. · OLEAN, N. Y.
One of the Dresser Industries
Sales offices in Principal Cities Throughout the World

Balanced/Opposed Compressors

CLARK®



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Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
⅛ to 1 ton capacites—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
¼ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... *CM Trolleys and Cranes*

Call the CM distributor for descriptive literature, prices and fast delivery from stock.

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND
In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

For more facts circle 618 on Reply Card

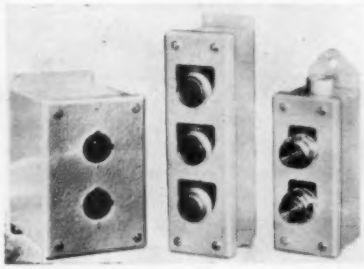
NEW PRODUCTS

(Begins on page 192)

Capable of working at a continuous pressure of 6000 psi, the pump is designed to develop up to 10,000 psi intermittent pressure. The pump is also available powered by an ac-dc universal electric motor or a four-cycle gasoline engine. More information is in Bulletin E-223. Greenlee Tool Co.

40—PUSHBUTTON BOXES in some new shapes

Extra deep, slim and pendent oil tight, steel pushbutton enclosures are recent additions to this manufacturer's line of standard 3-in. deep, oil tight pushbutton boxes. They are designed to receive any regular make of oil tight pushbutton control unit. The extra



deep enclosure (left in photo) is 4-¾ in. deep and provides the greater space needed for wiring stacked or tandem oil tight pushbutton units. Ten standard sizes accomodate 1 to 25 pushbuttons. The slim enclosure (middle) is 2½ in. and can be mounted vertically or horizontally. Standard sizes hold 1 to 10 units. The pendent model is 2½ in. square and has a conduit hub. Standard sizes hold up to eight units. All types have gasketed covers and external mounting feet. Cover screws are captivated and threaded into sealed wells. Hoffman Engineering Corp.

41—ONE-COAT CHEMICAL protects concrete floors

Treet Creet is used for curing new concrete floors and sealing and maintaining old ones. Manufacturer says it does this with a single-coat application at a material cost less than 1½ cents per square foot. It penetrates concrete to a depth of about ⅛ in., depending on porosity, and seals the floor, it is stated; the concrete must be worn off to this depth before treatment is again needed.

Applied to new concrete, as soon as it is dry enough to support the weight of a man. Treet Creet is claimed to seal the surface in 6 to 8 hr, with the floor

LATEST INFORMATION ABOUT USS "T-1" STEEL

Send the coupon for your FREE copy!
It tells WHERE to use USS "T-1" Steel!
WHEN to use it! HOW to use it!

Get this newly revised compilation of technical and application data.

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It will help you design and work with this remarkable constructional alloy steel.

REMEMBER!

No other steel possesses "T-1's" remarkable combination of high yield strength, toughness and weldability. Send the coupon for complete facts!

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TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS "T-1" CONSTRUCTIONAL ALLOY STEEL

"USS" and "T-1" are registered trademarks.

UNITED STATES STEEL

USS

For more facts circle 619 on Reply Card

ALL-NEW TECHNICAL BOOKLET!

United States Steel
Room 5623, 525 William Penn Place
Pittsburgh 30, Pennsylvania

Please send a copy of your new booklet, USS "T-1."

NAME AND TITLE _____

FIRM _____

ADDRESS _____

CITY _____ STATE _____

Schramm Compressors provide air for chipping, cleaning, grinding, drilling, operating hoists and lifts, sand rammers, vibrators and molding machines.

ONE AIR COMPRESSOR USER REPORTS:

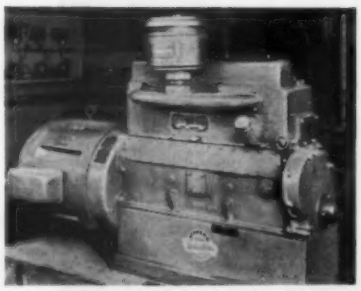
"Eight years of satisfactory service and not a cent for repairs"

In modern foundry and steel mill practice, where compressed air is indispensable, Schramm Industrial Compressors are establishing new records for continuous, trouble-free performance.

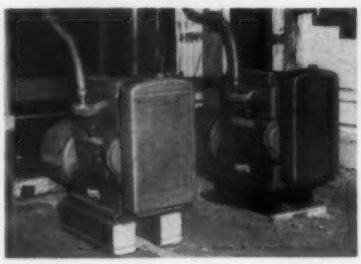
Schramm Compressors set performance records because they incorporate many design features found in no other machine. Balanced reciprocating parts give vibrationless operation, permit out-of-the-way installation without special foundations. Schramm engineered cooling systems—air blast for units delivering 50 cfm of free air, or less; liquid cooling for larger sizes—provide adequate cooling for full load, permitting continuous operation.

The economic advantages of buying Schramm Industrial Compressors are outstanding. Initial cost, compared with other compressors delivering the same amount of free air, is low. Maintenance of Schramm Compressors is no problem—any mechanic who understands gasoline engines understands Schramm Compressors.

Write today for free literature.



JACKETED LIQUID COOLING SYSTEM. Units delivering 85 cfm and over are jacketed for liquid cooling. Furnished with inlet and outlet flanges or Schramm cooling unit.



NO FOUNDATIONS. Schramm balanced design permits installation without expensive foundations. Units can be set up in almost any out-of-the-way location.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

For more facts circle 620 on Reply Card

NEW PRODUCTS

(Begins on page 192)

then ready for traffic. It eliminates need for wetting-down during curing, company adds, and extends curing time up to 90 days to give a perfectly structured floor—usable as quickly as in quick cure methods. Applied to old concrete, after cleaning, Treet Creet dries within an hour. Treet Creet may be painted over, if desired, it is colorless when dry. For floors below ground level, Treet Creet is said to provide an effective seal against rapid moisture penetration from below. Magee Chemical Co.

42—ALUMINUM JACKETS protect insulated elbows

Announced as an economical solution to the problem of protecting insulation on elbows, Ell-Jackets are deep-drawn from 0.020 in. aluminum, No. 3003 alloy. They are designed to cover and protect insulated elbows and are made

for both 90- and 45-deg ells, and have factory-applied moisture barrier. The two-piece Ell-Jackets are precision formed to fit snugly over the elbow, says manufacturer, and they afford weather-tight protection. They are applied with aluminum sheet metal screws and no special tools are required. Ell-Jackets come in 23 sizes for 90-deg ells, and 23 sizes for 45-deg ells to cover all lines having a 1½ to 10 in. nominal pipe size and insulation from 1 to 3 in. in thickness. Childers Mfg. Co.

43—LOW COST PUMP with high output

This positive displacement pump has rubber rollers acting as rolling vanes. It can be direct coupled to a gear reduced motor or engine, has 2-in. ports and delivers up to 95 gpm at 700 rpm. Its output is not greatly reduced at higher pressures, manufacturer states —at about 40 lb pressure (92-ft head) the pump output is still about 85 per cent of the open discharge flow. A feature announced for the pump is its spring loaded pressure-relief endplate which protects the pump and connect-

Mr. Clyde Dockey
PURCHASING AGENT
Midwest Abrasive Company
Owosso, Michigan

"People often are hoggish about paper towels"

WITHOUT realizing it they'll use from two to four single fold towels just for drying.
— wasting up to 40 inches of towelling.
But you can control this waste.
With savings up to 40%!
How?
*By installing WESTROLL TOWELS in West Micromatic Cabinets.**

PEOPLE quickly unroll as little or as much as they want. But without realizing it they take less. Averaging 17 inches of soft, absorbent WESTROLL.
Saves janitors' time, too.
— one filling of the tamper-proof cabinet equals four of a single fold towel dispenser.
— there's less litter to clean up.
And washrooms are cleaner, neater.
**Cabinets are loaned.*

"Even our janitors approve of Westroll Towels"

"We first purchased Westroll Towels with the idea that we would be supplying our men with soft, absorbent towels, the use of which would be economically controlled. Now we find that even our janitors are enthusiastic about Westroll. Our washrooms stay free of litter — and one filling of our Westroll Dispensers is equivalent to four fillings of ordinary flat towel dispensers," says MR. CLYDE DOCKEY, Purchasing Agent for the Midwest Abrasive Company, Owosso, Michigan.

"When you consider these economies and conveniences, you can see why we're all pleased with Westroll."

Would similar savings interest you? Send the coupon.

LARGEST COMPANY OF ITS KIND IN THE WORLD

WEST DISINFECTING Company

WEST DISINFECTING COMPANY, 42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities • In Canada: 5621-23 Casgrain Ave., Montreal

☐ Please send your free folder on cutting towel costs with Westroll.
☐ Please have a West representative telephone for an appointment.

Name.....

Position.....

Mail this coupon with your letterhead to Dept. 19

For more facts circle 621 on Reply Card

only circuit breakers
protect continuity
in automation

fewer power stoppages...
faster restarts...
guard production levels

circuit breaker protection is sure and accurate

YOU CAN BE SURE... IF IT'S Westinghouse

J-30274-A

For more facts circle 622 on Reply Card

NEW PRODUCTS

(Begins on page 192)

ing pipe or hose lines from excessive pressures. The pump is reversible and self-priming up to 10 ft above the liquid source. Once primed, it has suction lift exceeding 20 ft. With synthetic rubber rollers, the pump is reported especially suitable for water and many aqueous solutions, and reasonably tolerant to non-abrasive solids entrained. Hypro Engineering, Inc.

44—SAFETY VALVES for set pressures up to 300 lb

The 1875 series of super capacity top-guided, bronze pop safety valves is introduced for steam generator service and air or gas applications at set pressures to 300 lb at 450 F. Announced as ASME approved for power boiler and unfired pressure vessel codes, the series is designed to offer minimum inlet pipe size with maximum pressure capacity and low cost. Extra-long top guiding is utilized to give safe, positive protection. The line includes three styles: with plain cap, with open lever, and with packed cap and lever. Sizes are ½ to 3 in. male inlet, female side outlet. Farris Engineering Corp.

45—WIPING CLOTHS made of silicone treated rayon

These non-woven rayon cleaning and polishing cloths are silicone treated to impart a protective, odorless, non-greasy coating to highly finished glass, plastic and metals. Manufacturer says they offer protection against finger prints and the etching action of skin acids, dust, line, mildly corrosive atmospheres, grit and moisture. The cloths are 18-by-16 in. A package of 100 costs around $27. Prices are lower when larger quantities are ordered. Edmund Scientific Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 277-278. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

46—CONVEYOR GATE goes up with little effort

This conveyor hinge section operates with only 10 lb of lifting effort, manufacturer states — helpful to the man who must operate the gate while carrying a load or pushing a loaded truck. The gate has a coil spring counter-

UNLOADING 40-FOOT LONG structural steel columns, Breman Steel's American 300 Series yard crane averages 12,000 pounds per pick with a *flat boom*! Operator John Smith reports that the American Self Propelled Crane is, "More flexible than others and highly mobile, too".

AMERICAN YARD CRANE AVERAGES 6-TON LIFTS WITH FLAT BOOM!

In the yards of Breman Steel Company, an American 300 Series Crane proves its speed, versatility and mobility day after day. Working with a hook, the American Self Propelled Crane handles heavy steel beams—averaging 6-ton lifts. Equipped with a magnet, the crane loads a gondola of No. 2 scrap in 1½ hours for the Atlanta, Ga., firm. Extremely maneuverable, the 30-ton capacity crane moves easily, smoothly down narrow yard aisles to spot or pick up materials. The ability to work with a flat boom or move safely while carrying a capacity load proves the American's exceptional combination of balanced design and power. Highly responsive controls mean safe, accurate load handling!

A complete selection of interchangeable fronts—crane boom, grapple, clamshell, dragline, shovel or magnet—tailors American Self Propelled Cranes to *every* job in yards of all sizes! For magnet work American offers the exclusive, thumb controlled "over-excitation" that boosts magnet pickup capacity by as much as 20%.

A complete line of American Cranes meet the demands of every industry: crawler, truck and self propelled cranes offer capacities from ½ yard, 12½ tons to 1½ yards, 50 tons; American Locomotive Cranes—capacities to 80 tons; big American Revolvers—capacities to 400 tons! For information on the American crane to perform your job best—for the name of your nearest distributor—fill out and mail this coupon:

AMERICAN HOIST
and Derrick Company
1882-1957 **75** *years of service*
St. Paul 7, Minnesota

For more facts circle 623 on Reply Card

AMERICAN HOIST and Derrick Co.
Saint Paul 7, Minnesota

Our operations require ..... ton lifting capacity—
please send catalogs on American

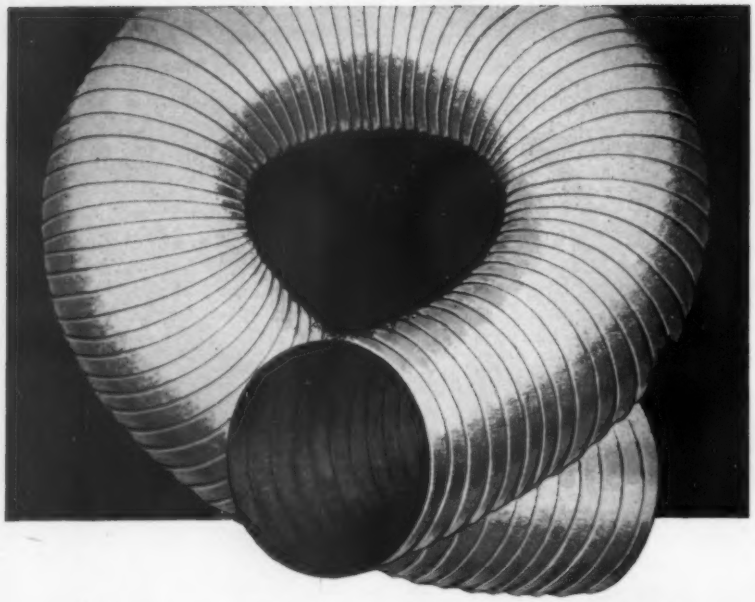
☐ Self Propelled ☐ Truck ☐ Crawler Cranes that meet this specification

NAME ..... TITLE .....

FIRM .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....



facts about Flexflyte®

that will help you solve your ducting problems

What is Flexflyte?
A lightweight, reinforced ducting made of a spring steel wire helix covered with coated fiber glass or a cotton fabric and bound with a fiber glass cord.

What are its applications?
Flexflyte is used for transmission of hot or cold air, fume removal, dust collection, materials handling, etc.

How flexible is Flexflyte?
It will take tight turns at any point up to 180° without buckling. No elbows or fittings are required.

Can Flexflyte be engineered for unusual applications?
Yes. Special fabrics, coatings, connections, lengths and diameters are available. Our special Silicone Department, working with automated machinery, is prepared to meet any requirement for silicone ducting.

Is it flame resistant?
Flexflyte has exceptionally high flame resistance and will not support combustion.

What about Flexflyte's resistance to abrasion?
It is highly resistant to abrasion, especially when coated with FT-506 which has more than 200 times the abrasion resistance of any tubing of its type and weight.

What about installation?
Flexflyte is quickly, easily installed by means of metal clamps. It is also available with special enlarging or reducing ends, either cylindrical, rectangular or polyhedral.

What are its temperature ranges?
From minus 120°F. to plus 650°F.

What pressures will Flexflyte handle?
Internal working pressures up to 70 psi and external working pressures up to 15 psig according to type.

How can I make sure that Flexflyte will solve my problems?
Write us, outlining your requirements. Our engineers will be glad to put their experience to work for you. Write Dept. 99.

Sold through industrial distributors from coast to coast.

Flexible Tubing
CORPORATION
GUILFORD, CONNECTICUT • LOS ANGELES 64, CALIFORNIA
For more facts circle 624 on Reply Card

NEW PRODUCTS

(Begins on page 192)

balance which reduces the amount of lifting effort usually required to raise a conveyor gate. Furnished in the widths of company's wheel and roller type conveyors, this hinge section consists of a stationary section of conveyor with a 3-ft wide gate. The gate section utilizes a support at the hinge point, and striker arms or hook connectors which secure the free end of the gate to the adjoining conveyor section. It requires 21 in. minimum clearance from floor to bottom of conveyor. The Rapids-Standard Co., Inc.

47—MOP TRUCK features longer wearing wheels

Wheels on this company's 56-gal mop truck now have semi-pneumatic tires, 8 in. in diameter and 1¾ in. wide, and a ⅝-in. ID axle bore with sealed ball

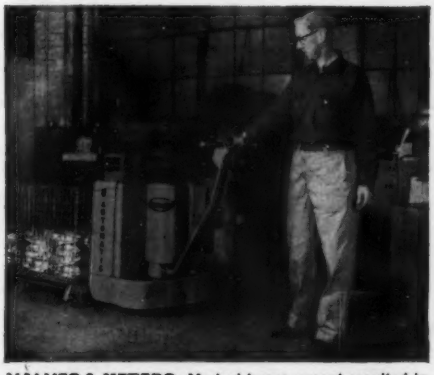
bearings. There are two sets of bearings in each wheel, and wheel disc is welded steel. Streamlined in design, this truck affords greater clearance and conserves storage space, it is pointed out. Tank corners are rounded and the wheels (two of them swivel) are recessed. A mop shield beneath the wringer keeps the mop from dipping into the dirty water. There are two 28-gal capacity tanks. The truck comes in galvanized or stainless steel. Finnell System, Inc.

48—EPOXY RESIN for surface coating and bonding

Sonite SC-1 is reported to offer many advantages when used as the gel-coat for hand laminations, as a surface coating for tanks and barrels, or as a bonding agent with good adhesion and chemical resistance and stability. It is described as a light yellow material with sufficient thioxtrophy for application as a heavy brush coat without sagging on vertical surfaces. According to announcement, the material has a storage life of at least 12 mos in the closed container. Normally it is

CONCRETE PRODUCTS: This Automatic TRANSPORTER works indoors and out, day and night, in all kinds of weather for the Permacrete Products Corp.

TAGS & LABELS: Stacker model TRANSPORTER with special paper roll clamp handles and tiers 800-lb. paper rolls all day long for Central Tag Co.



VALVES & METERS: Marked improvement resulted in handling finished parts when this TRANSPORTER went to work for Rockwell Mfg. Co.

AUTOMATIC TRANSPORTATION CO.

Division of The Yale & Towne Manufacturing Company

Dept. P-7, 105 W. 87th Street, Chicago 20, Ill.

Automatic TRANSPORTER

LEADS ITS FIELD IN COMPACTNESS... EFFICIENCY...ECONOMY...

Automatic TRANSPORTERS are available in many different types ...low and high lift platform or pallet...fork, straddle and retractable mast type stackers...tractors. These short, compact trucks perform all handling functions of standard rider type trucks, yet cost considerably less.

All models combine the flexibility, economy and dependability of electric power at its best with many exclusive operating advances. Capacities, 1,000 to 10,000 lbs. depending upon model. Complete line of attachments available.

But see for yourself the superiority of Automatic TRANSPORTERS. Figures below are for low lift pallet model comparison but other TRANSPORTERS show equally impressive advantages.

CAPACITY...		TRANSPORTER 5,000 LBS.	TRUCK A 4,000 LBS.	TRUCK B 4,000 LBS.	TRUCK C 4,000 LBS.	TRUCK D 4,000 LBS.
SHORTER	Overall length less load...	21½"	25¼"	26⅜"	23¾"	24"
MANEUVERABLE	Maximum Overall width	29"	32"	32"	27"	32¼"
BETTER INCHING CONTROL	3 Speed Control	Yes	No	No	No	No
MAXIMUM HEAT PROTECTION	Class H Silicone Insulated motor	Available	No	No	No	No
MORE EFFICIENT	Hand or foot lowering control	Both	Hand Only	Hand Only	Hand Only	Hand Only

MAIL COUPON for complete TRANSPORTER specifications and FREE "Cost-Cutter" Materials Handling booklet.

Automatic Transportation Company
Dept. P-7, 105 West 87th St., Chicago 20, Ill.

Please mail me complete specifications for the Automatic TRANSPORTER Line and include FREE copy of your booklet, "Materials Handling COST-CUTTER.

Firm Name.....by.....

Address.....

City & Zone.....State.....

For more facts circle 625 on Reply Card

Each of the two illustrated troughs can carry as much cable as all of the paralleling conduit

COPE CABLE TROUGH SAVES STEEL BY THE TON!

Problem. 100 miles of cable to be supported in a New Jersey power generating station.

Solution. A careful cost analysis of available methods and materials convinced plant engineers that Cope's expanded-metal cable trough was the best choice. Why? Among other reasons, it meant a saving of more than a ton of steel for every 60 feet of trough installed, as compared to conduit . . . a total saving in excess of 250 tons of steel for the 15,000 ft. of trough required for the completed job!

Here's How You Save. *One* 10 foot section of 24" width Cope trough supports as many cables as 16 lengths of 4" conduit and it only weighs 54 lbs., compared to 575 lbs. for this same amount of conduit. This adds up to real economy regardless of the size of your installation. Cope's expanded-metal cable trough simply uses *less* steel to do the job and obviously this can mean substantial savings for you!

Cuts Labor and Maintenance Costs, Too. Design and construction features of lightweight Cope trough speed installation of space saving systems—even in the most cramped quarters. Easy-to-get-at trough simplifies cable inspection and repair . . . provides ready re-routing and facilitates system additions.

You save *three* ways when you specify Cope cable supporting equipment . . . trough, ladder or channel.

- **LOWER FIRST COST**
- **LOWER INSTALLATION COSTS**
- **LOWER SYSTEM MAINTENANCE COSTS**

Discuss these advantages for *your* installation with a qualified Cope representative—or write to T. J. Cope Division, Rome Cable Corporation, Collegeville, Pa.

1000

T. J. COPE *Division*

ROME CABLE CORPORATION

For more facts circle 626 on Reply Card

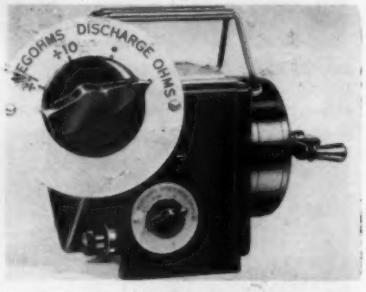
NEW PRODUCTS

(Begins on page 192)

shipped with hardener to give a pot life of 10 min to 1 lb in a pint container at 72 F—slower curing agents are also available. Smooth-On Mfg. Co.

49—INSULATION TESTER has a four-position switch

Recently introduced on the Meg Type Megger Insulation Tester is a four-position switch. The hand-operated generator models now provide facilities not formerly available in one instrument, says manufacturer. The A-R-K Switch includes; (A) megohms ÷ x 1 and ÷ x 10; (R) ohm scale; and (K) capacitance discharge switch.

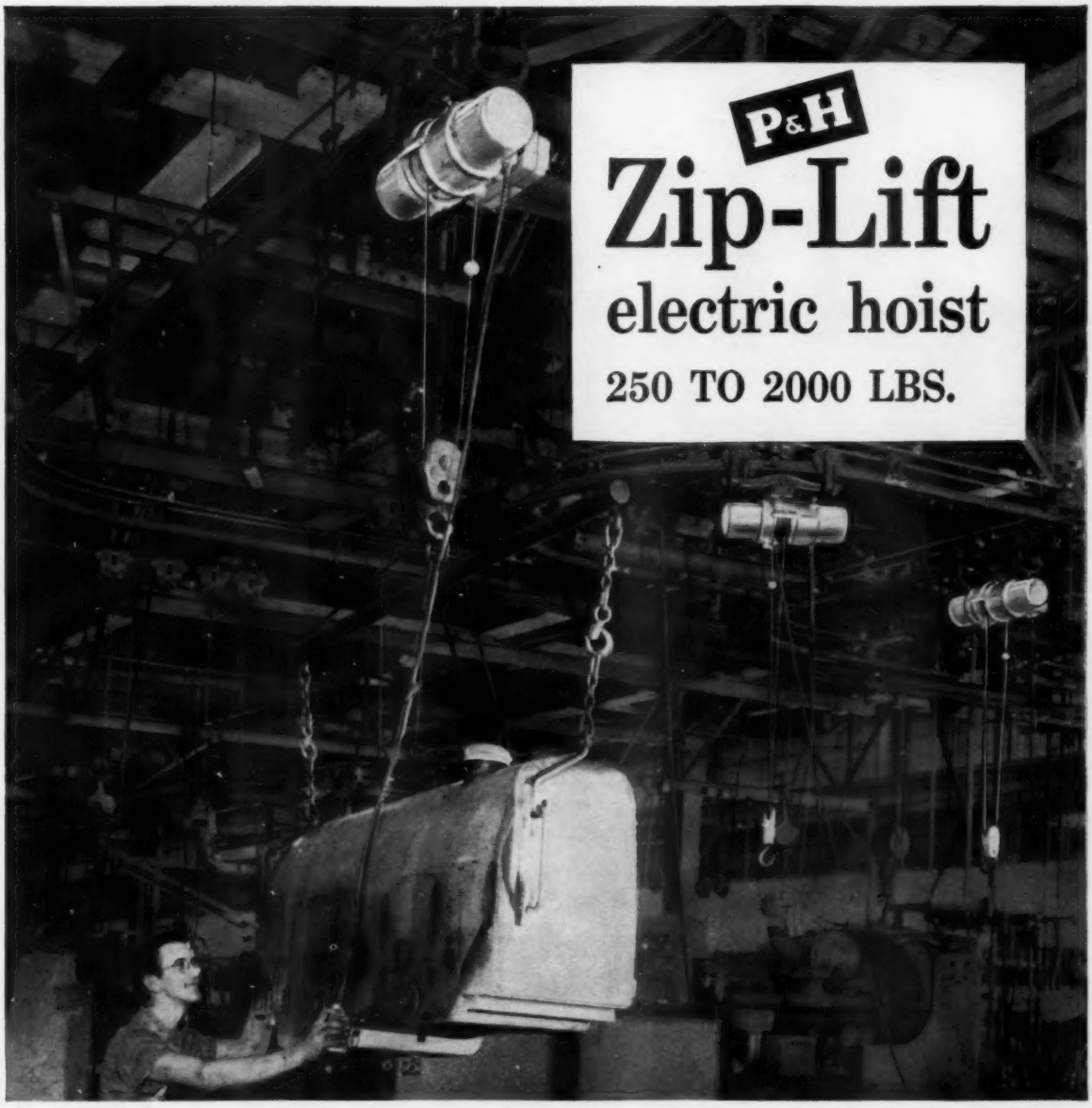


In addition there are earth, line and guard terminals so arranged as to require no change of connections when switching to the ohm scale.

The ratio switch (A) divides by 10 the regular megohm scale. Thus, an instrument with normal range of 0 to 1000 megohms also has, with the ratio switch, a range of 0 to 100 megohms, permitting insulation resistance measurements down as low as 10,000 ohms. Discharge switch (K) permits discharge of capacitance in the apparatus under test. This charge is built up during the test because the test voltage is d-c. The ohm scale (R) switch has a range from 0 to 10,000 ohms. With it tests can be made of conductor resistance without resorting to other test equipment. The ohm scale is used in addition to and independently of the Megohm scale. It is pointed out that this facility for discharging capacitance removes hazard to persons and equipment that might come in contact with charged apparatus following the test. Bulletin 21-45a gives particulars on the tester. James G. Biddle Co.

50—RECIPROCATING PUMP made of stainless steel

This air operated reciprocating pump is of stainless steel to make it suitable for food products and tough enough to withstand effects of corrosive materials. It is designed to handle fluids



Heavy on safety... light on price!

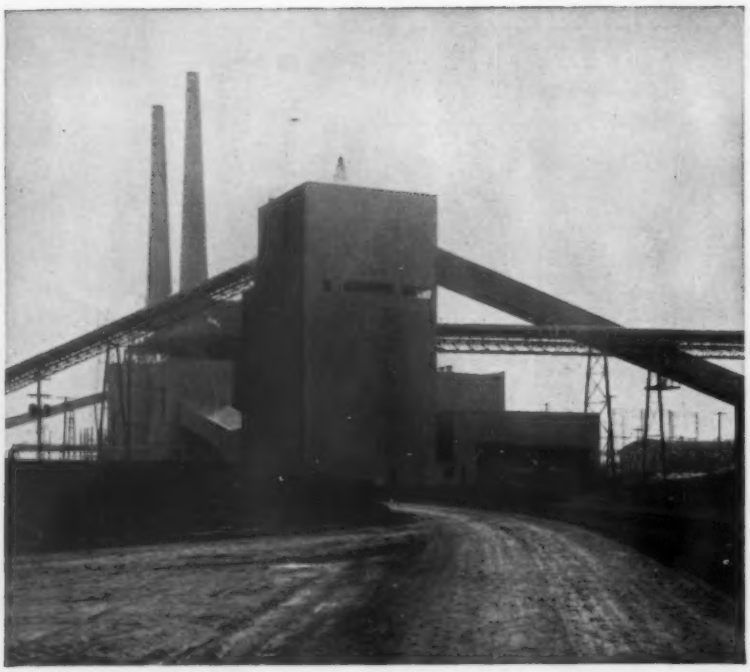
Here's a wire-rope hoist that can put ZIP into your material handling—eliminate production delays and back-breaking manual lifting — and still be kind to your pocketbook.

And P&H Zip-Lift® is *extra-safe!* It has two brakes — and either of them will hold capacity loads *even if power fails.* Upper and lower limit switches protect both load and hoist . . . the shrouded load block guards worker's hands . . . low 24 volts at push-button station assures operator safety.

These safety features are standard on Zip-Lift — all included in the basic low, low price. They are illustrated in our Bulletin H-20, along with new design features that make Zip-Lift your best hoist buy. We'll gladly send you a copy. Write Dept. 211C, Harnischfeger Corp., Milwaukee 46, Wis.

HARNISCHFEGER

P&H ...quality and service for 73 years



Moves a million-ton mountain of coal a year!

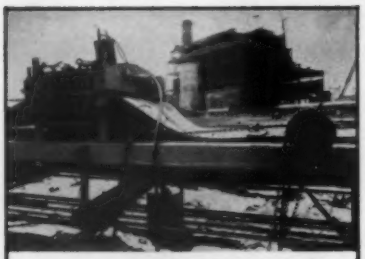
One of the largest in the U. S., this system depends on over 7,000 feet of Quaker Rubber belting to keep the coal moving.

PROBLEM: The Detroit Edison Company needed three separate conveyor systems to carry coal into their River Rouge power plant: (1) dock to storage, (2) dock to breakers to plant, (3) storage to breakers to plant.

SOLUTION: Quaker engineers and the Quaker distributor's men, working with engineers of the power plant, suggested the use of a belting designed for high lifts and long center distances. Over 7,000 feet was installed.

RESULT: The three conveyor systems work smoothly and efficiently, carrying coal into the plant at the rate of one million tons a year.

YOUR PROBLEM: Whatever your conveyor needs, whatever your industry—there's a Quaker Rubber Belt (or Hose) of the *right* construction to handle the job safely and economically. Quaker engineering service is available for the asking.



To make sure 7,000 feet of Quaker Rubber conveyor belting (available in 48", 60" and 72" widths) was properly installed, splicing and vulcanizing of the belting was supervised by a Quaker Rubber specialist.

For your free brochure on conveyor belting, write your nearby Quaker Rubber distributor, or:

H. K. Porter Company, Inc.,
Quaker Rubber Works,
Philadelphia 24, Pa., or
Pioneer Works, Pittsburg, Calif.

H. K. PORTER COMPANY, INC.
QUAKER RUBBER DIVISION

For more facts circle 628 on Reply Card

NEW PRODUCTS

(Begins on page 192)

from —30 to 220F, at discharge outlet pressures of 1½ times the incoming air pressure. It operates on an air supply range of 30 to 200 psi and pumps from 1-20 gpm, depending on air pressure used. Material is delivered in equal amounts on both up and down strokes of the pump without pulsation, says manufacturer, and caps and seals meet requirements for pumping acids, food products, stripper materials, brighteners. It is pointed out that the air motor which operates the pump is separate, preventing possibility of pumped fluids mixing with the air mechanism. Although slightly higher in cost than conventional reciprocating pumps, it is reported lower in both initial and long-run costs than most rotary pumps. Balcrank Inc.

51—LOCKER RACK offers cost and space savings

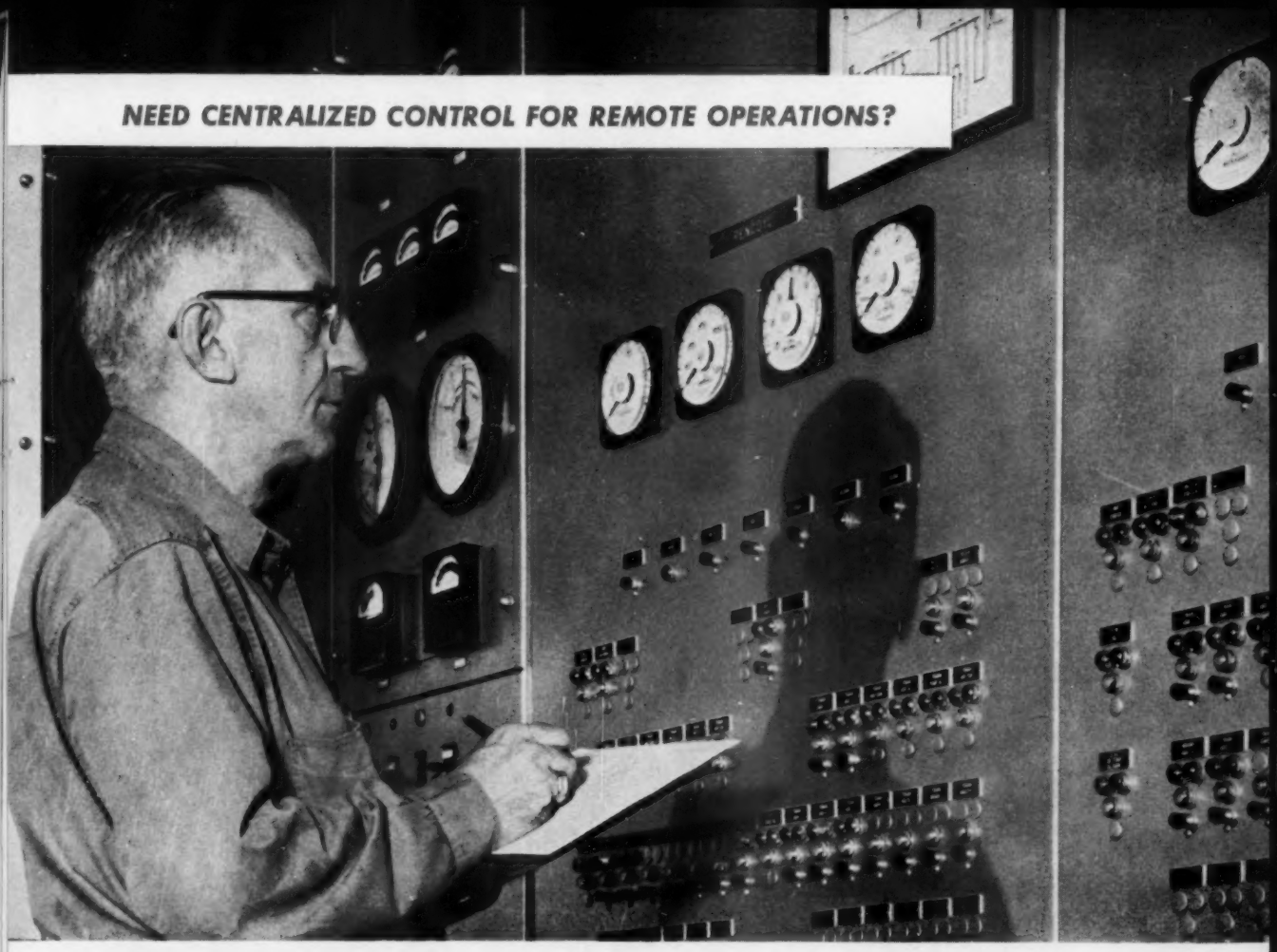
This economical, portable locker rack accommodates 10 persons in minimum floor space, says manufacturer, and all

compartments are at convenient height. Each door has a built-in lock with two keys. A coat hanger and chain arrangement, which fits through sleeves, permits coats and jackets to be locked to the rack. The rack is 50 in. wide, 18 in. deep and 76 in. high and is finished in gray enamel. Lyon Metal Products, Inc.

52—CIRCUIT BREAKER permits two in a case

Type TR is announced as a twin plug-in circuit breaker which makes it possible to install up to twice the number of circuits normally possible in an average load center. Introduced at the same time is a line of circuit breaker load centers in main ratings from 40 to 200 amp, and two to 40 branch circuits. According to company, Type TR combines two breakers in a single 1-in. case. It is

NEED CENTRALIZED CONTROL FOR REMOTE OPERATIONS?



FOR DISTANCES AS SHORT AS 250 FEET . . . . .

General Electric supervisory equipment proves less costly than direct-wire systems

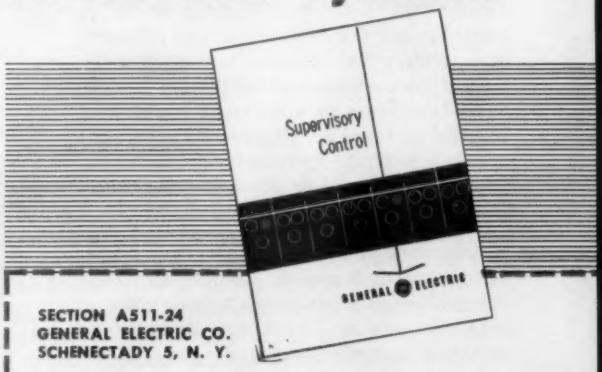
- A wide variety of functions, from opening and closing of switches and valves to adjusting speed, voltage, or load can be performed.
- It's versatile . . . and economical to install and operate, regardless of the distance between controlling and controlled points.

A new bulletin gives full details on comparison between supervisory and direct-wire set-ups. Why not contact your nearest Apparatus Sales Office for a copy? Or take a minute to fill out coupon at the right?

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 629 on Reply Card



SECTION A511-24
GENERAL ELECTRIC CO.
SCHENECTADY 5, N. Y.

I'd like full details on the economies of General Electric Supervisory Control Equipment. Please send me GEA-6603.

NAME.....

COMPANY.....

STREET.....

CITY..... **STATE**.....

A SUMO Submersible pump is a time-tested method of deep well pumping which is as modern as tomorrow. Its advantages are simplified installation, freedom from operating troubles, minimum maintenance and—above all—efficient utilization of power.

The SUMO design features a submersible electric motor coupled directly to the pump. The entire unit operates completely under water. Installation simply requires attaching the unit to the discharge pipe, lowering it into the well and hooking up the power supply.

Think what it means. No pump house to protect power source—controls and pressure tank go anywhere. Narrow or crooked wells present no problem—no long drive shafts, bearing spiders or alignment problems. There's no noise or vibration, no adjustments or priming. And the SUMO unit can't freeze or flood out, is safe from heat, dust and tampering.

Maintenance is equally simple. Only minimum servicing is needed. Completely interchangeable spare parts are available nationwide. There's no better way to insure a reliable supply of water.

WRITE FOR BULLETIN B1000. It contains information on operating details, capacities and installation.

SUMO PUMPS, INC.

Dept. 1 P. O. Box 983 Stamford, Conn.

SUMO SUBMERSIBLE Water Pumps

. . . the pumps that stand the test of time

For more facts circle 630 on Reply Card

NEW PRODUCTS

(Begins on page 192)

physically interchangeable with company's single-pole Type R breaker and 2-and 3-pole common-trip Type TQL breakers. Available in ratings of 15 and 20 amp, the breaker is suitable for use in protecting a-c lighting and appliance branch circuits. Handle extensions are available for combining two adjacent breakers for two-pole operation. General Electric Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 277-278.

53—IMPROVED CLUTCH for wet, dry applications

Style GS and GSW Electro-Magnetic Clutch offers easy installation, low maintenance, fast action and simple adjustment it is announced. Factory-sealed, over-sized bearings in the clutch are said to need no lubrication or attention under normal conditions. Friction linings seldom need adjustment for wear, says company, and when they do a simple turn of three screws compensates for lining wear. These same screws also provide a means for mechanically engaging clutch in event of power failure. Clutches can be actuated remote or direct with automatic or manual controls such as push buttons, limit switches, electric eyes. The clutches can be adapted to modern machine tools and are available in 4- to 9-in. diam. sizes. Bulletin 503 gives details. Stearns Electric Corp.

54—MULTI-PURPOSE LUBE does all kinds of work

Called a faucet and valve stem lubricant, this product has so many unusual properties that it is suggested for all plumbing and heating requirements as well as conventional grease-lubricated bearings and other machine elements. According to manufacturer, it retains its normal texture, structure and consistency even when subjected to extremes of hot or cold, and has a melting point far higher than any temperature to which it would conceivably be subjected. It is also reported exceptionally resistant to water, withstanding wettest operating conditions and providing greater protection against rust and corrosion. Also, says company, this lubricant's ingredients make it outstandingly resistant to oxidation, giving it the stamina of a lubricated-for-life bearing grease. Ex-

For more facts circle 631 on Reply Card ——→

Exterior view of General Filter Company's prefabricated steel warehouse.

Interior view of the warehouse, showing the large vertical storage space.

"Compared to our all-steel warehouse, another type building would have cost twice as much,"

says Otis L. Jarrett, Director of Public Relations
General Filter Company, Water Process Engineers, Ames, Iowa

When the General Filter Company needed a warehouse for storage of filtering materials, they purchased a 36′ x 60′ prefabricated steel building.

"In the first place," explained Mr. Jarrett, "thanks to the shape of the building, materials costs were kept to a minimum. Furthermore, we realized big man-hour savings in erection costs. It took only three days to put the steel building up, and our normally high construction labor costs were reduced to only 25% of the total expense. We have had no upkeep costs at all. We're convinced that *another type building would have cost at least twice as much.*"

This pre-engineered all-steel warehouse building can withstand very high winds. It is enclosed with Galvanized Steel Sheets which are corrosion-resistant, and have withstood blizzards and heavy rainfalls without the slightest leakage. It looks as new and shiny as the day it was erected and is versatile enough to be turned into an office or factory building if needed. The clear span interior enables material handling equipment to move with ease throughout the entire building.

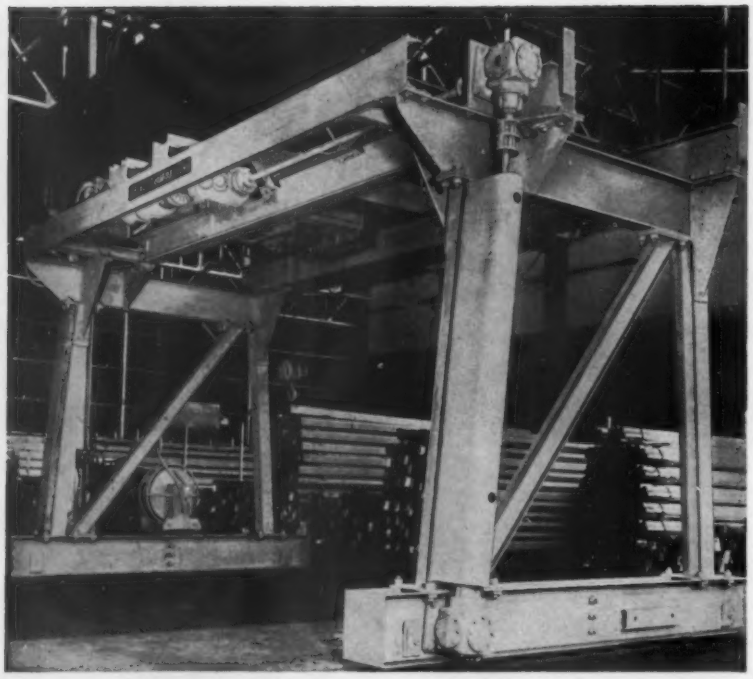
The General Filter Company is contemplating erection of several more steel buildings for housing processing equipment and manufacturing operations.

United States Steel Corporation produces high-quality steel products which our customers fabricate into durable steel buildings such as this one. Your requests for information will be forwarded to the manufacturers of these buildings and you will hear directly from them.

Address your inquiries to United States Steel Corporation, Room 2831, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

UNITED STATES STEEL

USS TRADE MARK



CHICAGO TRAMRAIL

GANTRY CRANES

At the modern plant of one of the country's largest aluminum companies, Chicago Tramrail Gantry Cranes handle long extruded pieces from a 14,000-ton extrusion press . . . transfer these pieces to other operations throughout the mill.

Fourteen Chicago Tramrail Full Gantry Cranes provide individual handling equipment for individual operations to eliminate waste time waiting for busy overhead cranes. Designed for heavy-duty, continuous service, these Gantries are built with maximum headroom and maximum clearance between legs to operate independently under the large overhead cranes.

For a practical, economical solution to your materials handling problems, see our experienced engineers. Special designs, sound engineering and broad application knowledge qualify us for helpful service.

CHICAGO TRAMRAIL CORPORATION

1324 SO. KOSTNER AVENUE • CHICAGO 32, ILLINOIS

OVERHEAD CRANES • JIB CRANES • STACKER CRANES • MONORAIL SYSTEMS

For more facts circle 632 on Reply Card

NEW PRODUCTS

(Begins on page 192)

treme pressure characteristics are announced for it, too, furthering its advantages as a load carrying grease. When used on machine elements, the lubricant is claimed to give top performance at high or low speeds, light or heavy loads. J. A. Sexauer Mfg. Co.

55—DIAPHRAGM PUMP meters and proportions

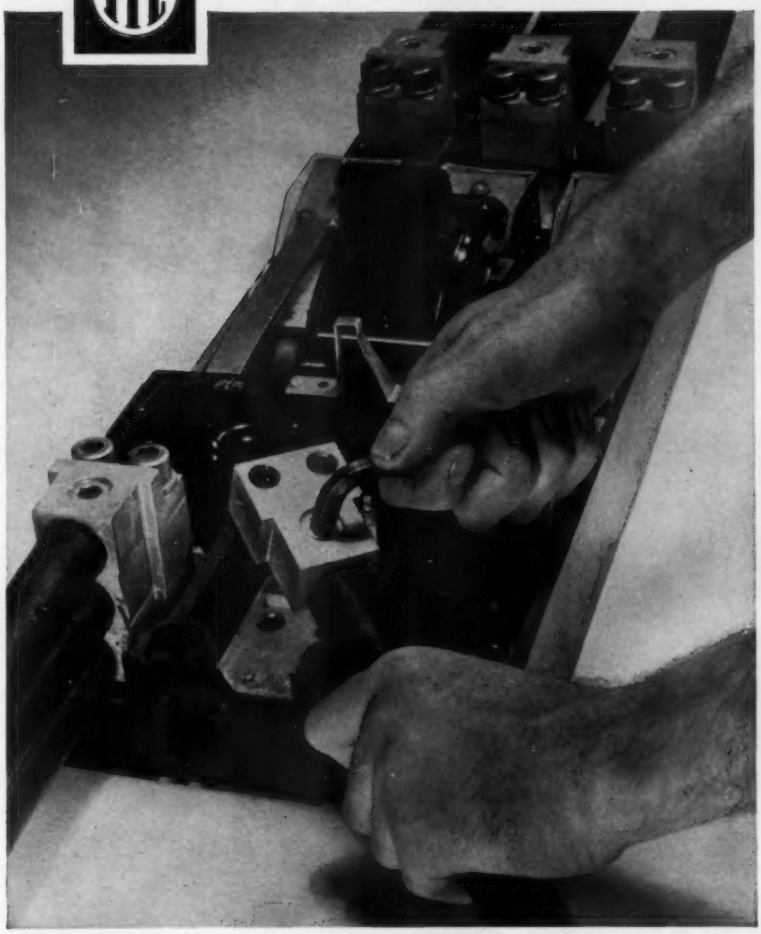
This packless diaphragm pump, for metering and proportioning fluids, is said to perform with accuracy and minimum maintenance at pressures up to 2500 psi. The diaphragm consists

of solid Teflon permanently bonded to, and covering, the face of an elastomeric backing. This type of construction is designed for long diaphragm life by combining the chemical resistance of Teflon with the flexibility of an elastomeric backing. Pump incorporates features such as packless design, capsulated construction, minimum maintenance and smooth, continuous flow in a wide output range. Hills-McCanna Co.

56—DUST COLLECTOR offers economy and efficiency

This vertical rotor dust and fume eliminator is introduced to meet the need for a relatively low-priced, yet efficient wet method collector. In it, contaminated air enters at high velocities and a cyclonic action is set up in the outer chamber, causing the larger particles to drop into the surface of the integral tank. The air stream then passes through a vertical water curtain to eliminate heavier particles, then through a high velocity horizontal water cutain to remove finer particles and remaining contaminants. A series of baffles removes excess moisture before purified air is either vented to atmosphere or returned to working area. The unit is easily maintained,

MOLDED CASE CIRCUIT BREAKERS



These individual cable lugs, each with an Allen head locking bolt, make connection of cables far easier and provide a much sturdier, neater assembly. An exclusive on all I-T-E 800 ampere breakers. UL approved for service entrance equipment.

I-T-E enclosures are side-hinged—no need to remove, or prop up, the cover. It is nevertheless easily removed, the hinge being of the pin-and-socket type—lifts off and on readily.

Field checks indicated that the addition of a supporting bracket would be a big help in installing larger breakers, and this feature is now added on all large-size enclosures.

To facilitate drilling holes of the desired size and position, end-plates of larger enclosures can be unscrewed and removed. Drill to your exact conduit needs.

SEVERAL EXCLUSIVE I-T-E FEATURES COMBINE TO SAVE YOU MONEY WHEN INSTALLING CIRCUIT BREAKER EQUIPMENT

In designing molded case circuit breakers for higher capacities, for example, I-T-E design engineers recognized that the difficulties inherent in making large multiple cable connections had to be considered. Pictured above is their solution—"stacked" lugs for time-saving installation. No need to fight clumsy, unyielding cables.

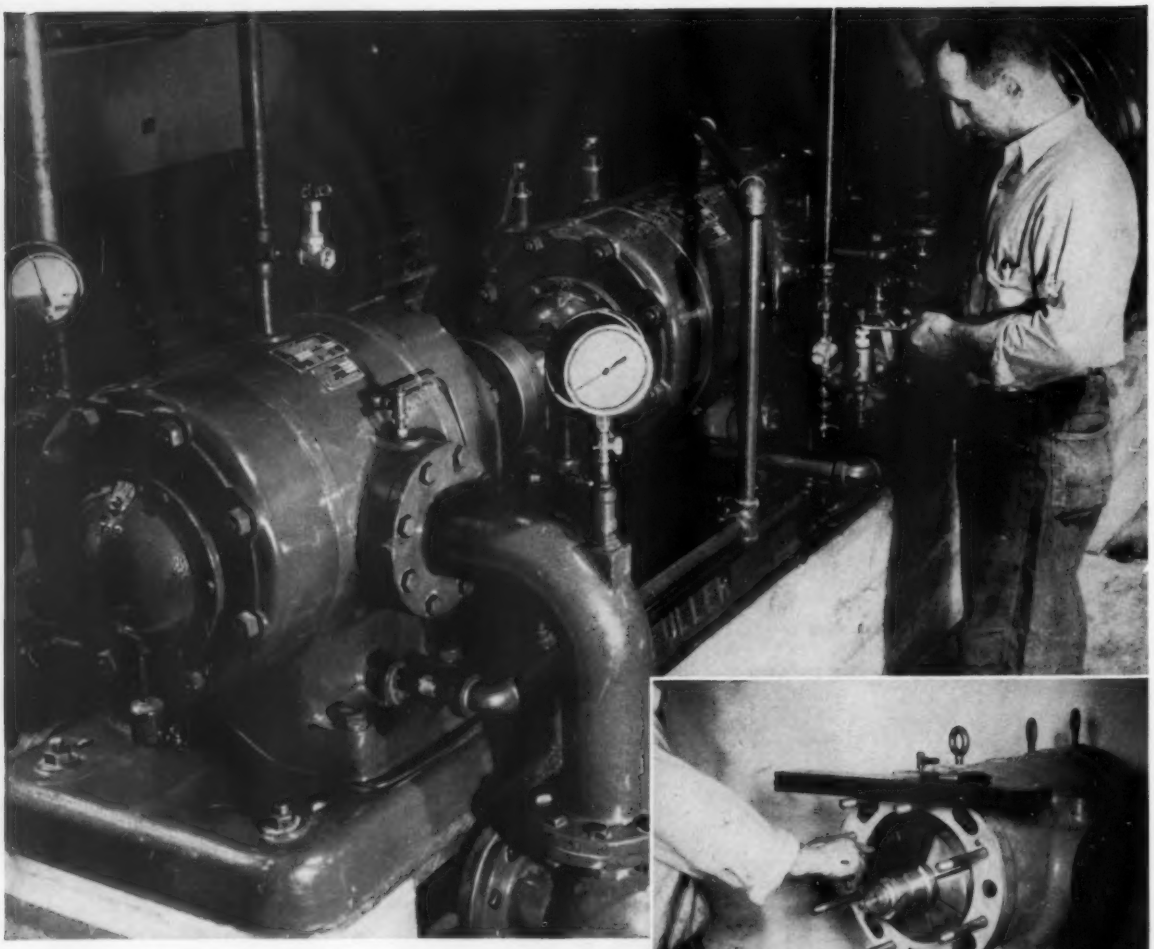
I-T-E enclosures, too, have exclusive, built-in features which greatly facilitate installation of circuit breaker equipment —saving additional installation time. And since time is certainly money these days, consider the time-saving features pictured here and you'll see how I-T-E can save you money even before your I-T-E breakers are in service!

I-T-E CIRCUIT BREAKER COMPANY • **Small Air Circuit Breaker Division**

19th & Hamilton Sts., Philadelphia 30, Pa.

IN CANADA: EASTERN POWER DEVICES LTD.

For more facts circle 633 on Reply Card



Blade inspection

PERFECT COMBINATION OF MEN AND MACHINES

Providing plant air for varied uses imposes heavy responsibility on both the compressor and its operator to keep production moving.

The simplicity of the Fuller Rotary Compressor principle reduces maintenance to an absolute minimum; by the same token, operator's universal pride in Fuller Rotary performance contributes to longer life of the compressor. Few moving parts and smooth operation limit the operator's work to periodic inspection.

This perfect combination of men and machines is worth investigating, with an eye to economies you, too, can enjoy. Write to Fuller Company, compressor sales department for detailed information.

FULLER COMPANY
138 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham • Chicago • Kansas City • Los Angeles • San Francisco • Seattle

C-316
4686

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

For more facts circle 634 on Reply Card

NEW PRODUCTS

(Begins on page 192)

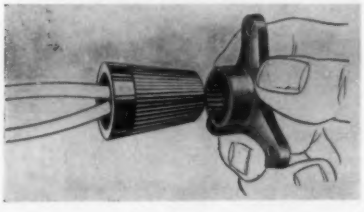
says manufacturer, can be constructed of corrosion resistant alloys or lined where necessary. It features low overall height to fit into trusses. Details are provided in Bulletin VRU-4-57. Schmieg Industries, Inc.

57—LUBRICANT for high temperature conveyor use

Anderol L-825 is offered for use on conveyor belt operations where conditions and temperature ranges require a versatile lubricant. According to manufacturer, the operating range of Anderol L-825 goes up to 500 F continuously and over 600 for short periods of time. Under such conditions, it is claimed to give twice the film strength and load carrying properties —and only 25 per cent of the volatility —of previously available wide temperature range lubricants. This means better and longer performance at high temperatures, says company, and less relubrication. Lehigh Chemical Co.

58—WRENCH for tightening wire connector joints

With the Lok-It, you can make "screw-on" wire connector joints so tight you cannot unscrew them with your bare fingers, it is announced. The wrench fits two sizes of company's Bakelite wire connectors (standard and large construction sizes), available for general use in branch circuit wiring. The



Lok-It is grooved to match the connector knurling. As the illustration shows, you simply slip the wire connector into the wrench socket—your fingers needn't touch the connector to slip it into the wrench. The new wrench has built-in gages for solid wires, Sizes 10, 12 and 14. It is offered without extra charge in an introductory package containing both sizes of wire connectors. Holub Industries, Inc.

59—DUST COLLECTOR features high efficiency

Low erosion rate and efficiencies as high as 97 per cent in some installations are reported for this centrifugal

HOT

–30° TO 1100° F.

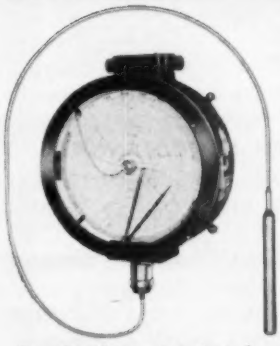
OR

COLD

WITH PARTLOW
THE TEMPERATURE IS
PRECISION-CONTROLLED

partlow

THE PIONEER IN MERCURY THERMAL CONTROLS



Recording Temperature Control

Degrees mean dollars. That's why Partlow Controls are used in more and more applications where temperature control is critical. Their pin-point accuracy insures positive protection for materials and equipment. Partlow Controls are precision-built for use with gas, oil, steam or water valves; or electrical equipment. Available in 9 standard ranges, from –30° F. to 1100° F.

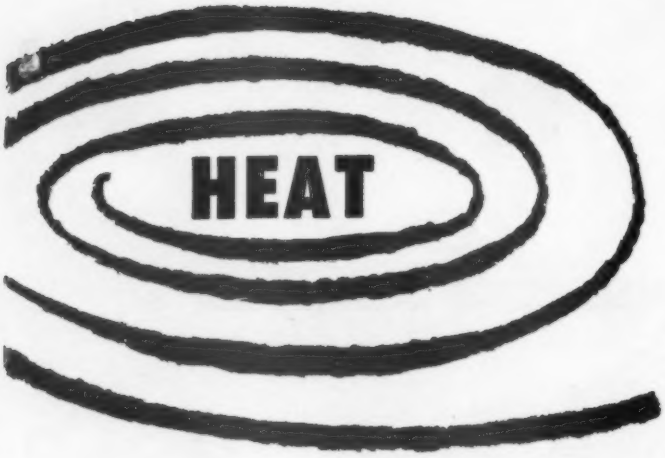
Visit us at Booth 1305-7
Instrument-Automation
Conference & Exhibit
Sept. 9-13 . . . Cleveland Auditorium

THE PARTLOW CORPORATION
Dept. PE-957 , 2 Campion Road, New Hartford, N. Y.

We'd like to know more about Partlow Temperature Controls.
☐ Have representative call. ☐ Send us your CONDENSED CATALOG.
We are interested in Partlow Controls for the following applications:

Company.....
Street and Number.....
City..... State.....
Signed.....

For more facts circle 635 on Reply Card



. . . may be the "trouble" with your electrical system

Are you troubled with nuisance power interruptions, insufficient branch circuit capacity, motor burnouts and the accompanying costly production delays? You will probably find that *heat* affecting your protective electrical equipment is the heart of your trouble.

You can eliminate heat considerations, however, simply by replacing with HEINEMANN Circuit Breakers.

HEINEMANN Circuit Breakers do not employ thermal elements or heaters of any type. Thus, their current carrying capacity and all set tripping points are completely independent of ambient temperature . . . unaffected even by nearby furnaces, steam pipes or cold drafts. HEINEMANN Circuit Breakers do not require de-rating. With HEINEMANN, 20 amperes means 20 amperes of usable capacity without needless tripping.

HEINEMANN Circuit Breakers operate on a hydraulic-magnetic principle. They provide inverse time delay to allow starting inrush or harmless, temporary overloads . . . yet they provide the fastest circuit interruption available on large overloads or short circuits.

GET THE COMPLETE FACTS: Send for your copy of "WHAT YOU SHOULD KNOW ABOUT CIRCUIT BREAKERS". Ask for Manual 101.

HEINEMANN ELECTRIC COMPANY
128 Plum Street • Trenton 2, New Jersey

HEINEMANN Circuit Breakers

For more facts circle 636 on Reply Card

NEW PRODUCTS

(Begins on page 192)

dust collector. This high efficiency is attributed to the design of the venturi-spiral vaned nozzles at the inlet of each separating tube. This effects an almost instantaneous six-to-one increase in gas velocity, it is explained, intensifying tangential or outward thrust characteristics of the centrifugal action. It is claimed that even particles of 5 microns and under are ejected and collected. According to manufacturer, this vane design produces an even flow distribution over the entire inlet nozzle area, eliminating critical areas of wear. Also stressed is the strong welded facing formed by the individual hexagon inlet nozzles; no supporting tube sheets are necessary. And since each inlet nozzle butts snugly against the others on all six sides, there are no flat waste areas to encourage dust deposits, manufacturer states. Hagan Chemical and Controls, Inc.

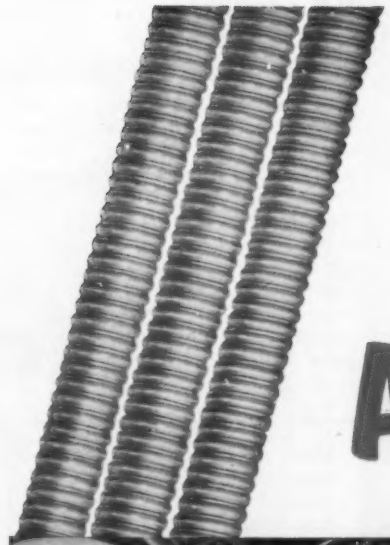
60—PLASTIC OILER is handy to use and carry

Squee-Zit is a plastic squeeze-bottle oiler that squirts a drop or a full stream of oil, with oil supply is always

visible. The oiler can sit straight up or on its side, says manufacturer; a double gasketed aluminum cap prevents spilling. Squee-Zit comes in 4- and 8-oz sizes, packed a dozen to the carton. Butler Stamping Co.

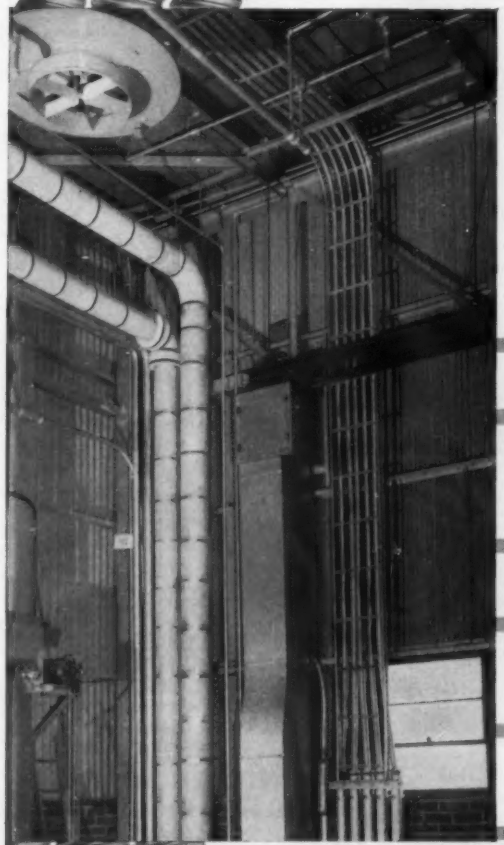
61—ROOF VENTILATOR with airfoil type fan

Wingjet Power Roof Ventilator has a powerful airfoil type fan in a weatherproof fan casing, it is announced, and covering this are non-chattering, aluminum dampers which are opened immediately by airstream and held as long as fan is operating. An upper casing or windshield surrounds and protects dampers and is open at top, without hood or raincap, for free, direct exhaust. The jet of air is carried at high velocity far above the roof to prevent vitiated air from damaging roof surfaces, or re-entering building.



GENERAL CABLE

Interlocked Armored Cable



FOR EVERY CONDITION

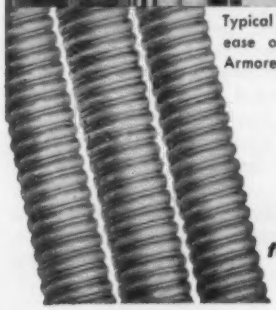
Whether constructing a new plant or expanding present power needs, General Cable has the right Interlocked Armored Cable for every condition. Interlocked Armored Cable provides savings through reduction of space requirements and installed costs. Flexibility and accessibility facilitate relocation and extension of existing wiring systems and provide ease of maintenance and repair.

Where a flexible yet well protected cable system is required, it pays to specify General Cable Interlocked Armored Cable.

CONDUCTORS:	copper or aluminum in full range of sizes.
INSULATIONS:	varnished cambric, rubber (Thermax-W, Aquaseal, Gencorone, Butarone), polyvinyl chloride, polyethylene, asbestos-varnished cambric.
ARMORS:	steel, bronze, aluminum.
PROTECTIVE COVERING:	polyvinyl chloride jacket in colors over the armor can be furnished, where required.
VOLTAGE RATINGS:	full voltage range as covered by industry standards.

Typical industrial application showing ease of installation of Interlocked Armored Cable.

GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, N. Y.
Offices and Distributing Centers Coast-to-Coast.



for quality and service... **specify GENERAL CABLE**

For more facts circle 637 on Reply Card

NOW···GLOBE OFFERS···
two new INTERCHANGEABLE trays for support of cables, wiring and tubing

★ Engineered for uniform design and easy installation
★ Steel or aluminum construction
★ Complete accessories for SPEEDIER Installation
★ No sharp edges to damage cables
★ Complete interchangeability

Now, for the first time, two types of cable trays, one a ladder type and the other a basket type, are available to be used INTERCHANGEABLY at any given location, depending on the type and weight of the cables to be suspended. The advantages of each type tray can thus be used to the fullest extent. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is intended for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants, in modernization, and for power distribution in all types of manufacturing processes. A new catalog, just off the press, gives full information and installation techniques. Ask for your FREE copy today.

Distributors are to be found in all principal cities— consult the yellow pages in your phone book under "Gratings" or "Conduits" for the one nearest you.

109

PRODUCTS DIVISION

The **GLOBE** *Company* MANUFACTURERS SINCE 1914

4016 SOUTH PRINCETON AVENUE, CHICAGO 9, ILLINOIS

For more facts circle 638 on Reply Card

NEW PRODUCTS

(Begins on page 192)

While fan is running, rain or snow cannot enter, company states, and when it is not operating, dampers close to form a weather-tight closure. Two types of Wingjet are available: Type B, for exhausting hot corrosive or fume-laden air, with motor located out of the airstream, in a weatherproof housing, driving the fan by means of a V-belt; and Type C, for exhausting uncontaminated air, with motor in airstream, connected to fan wheel. L. J. Wing Mfg. Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 277-278.

62—VAPOR CONDENSERS have increased capacities

Aero Vapor Condensers which replace barometric type condensers when needed to conserve water and to provide higher vacuum for evaporators are now available in increased capacity models. The steam or vapor is condensed in tubes over which water is sprayed, removing heat by evaporation in a stream of air, conducting the heat outdoors. Air, or non-condensible gas, mixed with vapor or steam to be condensed, is removed by steam ejector nozzle or vacuum pump, and is separated from condensate by specially designed screening baffle-tube in condensate drain. Purpose of apparatus is to achieve lower condensing temperature and more effective sub-cooling, providing better separation of non-condensibles to increase yield and obtain purer, more highly-refined product (in case of foods, better flavor). Condensing temperatures are within 20 F of atmospheric wet-bulb temperature. Niagara Blower Co.

63—STARTER ENCLOSURES are explosion resistant

Explosion-resisting motor starter enclosures are announced for NEMA 7 (Class 1 Groups C and D) and NEMA 9 (Class 2 Groups E, F and G). They have threaded joints and is reported dust tight and weatherproof for use in outdoor, hazardous locations. Cast from high-density aluminum alloy, the enclosures consist of a collar section, an upper tank and a lower tank. Two types of collar sections are available, one with circuit breaker operating

Other Fluoroflex-T® Products

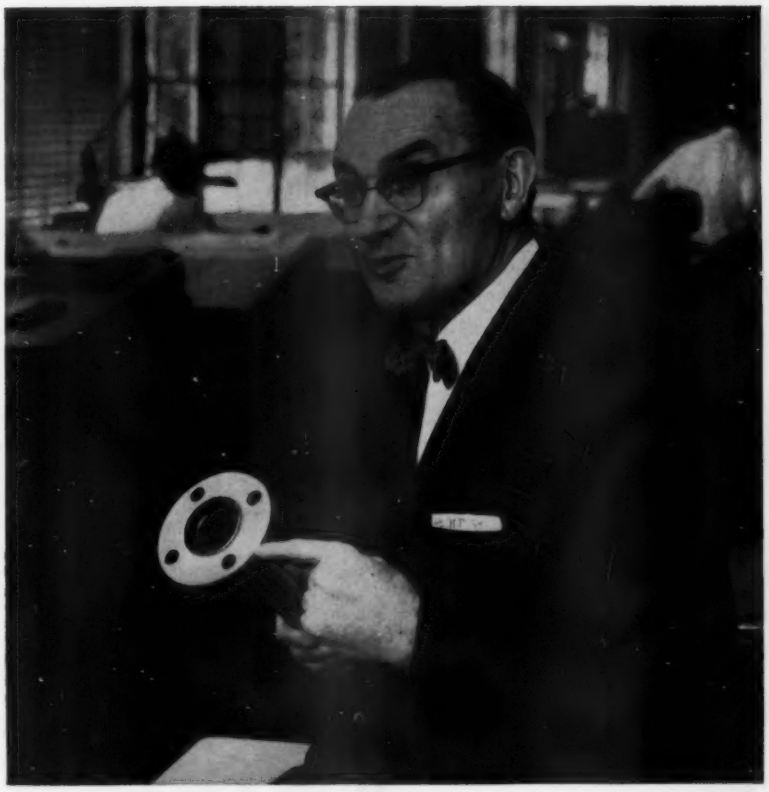
Chemical-proof flexible joint for severest service

MOLDED Fluoroflex-T reinforced bellows — a Resistoflex development — become strong links in any system where you need corrosion-proof flexible or expansion joints. Unlike bellows machined from solid stock, molded units have better grain structure, hence, superior flex life.

In one test by a user, Fluoroflex-T bellows were eccentrically flexed for twenty million cycles without fatigue or failure. These units have since been thoroughly time-proved in actual service.

Fluoroflex-T bellows dampen vibration, absorb expansion, correct misalignments... problems especially acute in fragile piping systems. Units can be fabricated for specific installation or operational requirements. Send for details.

CAUTION: Because the properties of Teflon products can be varied widely by the fabricating methods employed, the fabricator's experience and integrity remain the user's best assurance of quality and performance.



A new "end" for corrosion problems in hose

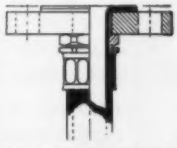
See how the patented Fluoroflex®-T tube is carried through the fittings and formed over the flange face. Here is complete protection against corrosion because fluids cannot possibly come in contact with metal.

This is the first time chemically inert jacketed fittings have been combined with chemically inert hose in a *continuous* integral assembly.

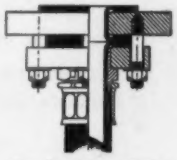
Fluoroflex-T flanged hose assemblies eliminate the need for special consideration of the type of metal used in the fittings — either for anti-corrosion or contamination needs. As a result of the continuous smooth bore construction, cleaning problems and entrapment of materials are eliminated for all practical purposes.

This hose handles active chemicals, solvents, gases and the most corrosive compounds. It is also applicable where vibration is a problem. It is non-aging . . . lasts indefinitely even at 500°F.

Write for data.



See how Fluoroflex-T tube is carried through fitting and across face of flange.



For frequent disconnects, a modified construction is available using a secondary Fluoroflex-T jacketed flange. This is replaceable, spares the major assembly from seal-damage.

® Fluoroflex-T is a Resistoflex trademark, reg., U.S. off.
® Teflon is a DuPont trademark.

Originators of high temperature fluorocarbon hose assemblies

Resistoflex
CORPORATION
Roseland, New Jersey • Western Plant: Burbank, Calif. • Southwestern Plant: Dallas, Tex.

For more facts circle 639 on Reply Card

NEW

NEPTUNE STAINLESS STEEL LIQUID METER

ONLY TWO MOVING PARTS IN THE LIQUID

Now you can achieve fine-instrument accuracy in the processing of corrosive liquids . . . in batching, blending, transfer, cost accounting, etc. . . . with this new Neptune Stainless Steel Meter.

Also important in many processes, this Neptune meter ends many problems caused by contamination of liquids being measured.

Based on the reliable Neptune positive displacement principal, its accuracy is completely protected from the effects of corrosion or corrosive wear. There are only two moving elements in contact with the liquid. The gear-train is mounted outside the casing, isolated from the liquid.

Available with Direct Reading, Print-O-Meter or Auto-Switch Registers. Size 1½", capacity 100 gpm. with most liquids.

Ask for Bulletin 94/10 PE

NEPTUNE METER COMPANY
19 West 50th Street, New York 20, N. Y.

BRANCHES IN: ATLANTA • BOSTON • CHICAGO • DALLAS DENVER • NEW YORK • NO. KANSAS CITY, MO. • LOS ANGELES • LOUISVILLE • PORTLAND, ORE. • SAN FRANCISCO-BAY AREA (MILLBRAE)
IN CANADA: NEPTUNE METERS LTD., TORONTO 14, ONT.

neptune

For more facts circle 640 on Reply Card

NEW PRODUCTS

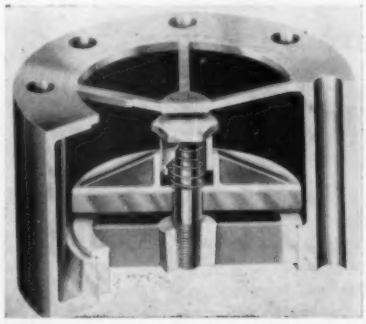
(Begins on page 192)

mechanism, one without. The tanks have internal Acme thread for strength and to reduce possibility of thread damage with tanks removed, and to keep out rain. A plugged and tapped opening in each tank is provided for the addition of a drain and breather.

Enclosures are designed for flexibility. Two sizes of tanks permit assembly of a variety of starter types in a collar section of a given size. Collar sections have tapped and plugged holes for installation of reset mechanisms, pushbuttons and selector switches. Two sizes are available, one for NEMA Size 0 or 1 starters, and one for NEMA Size 2 starters. Bulletin 9990 gives further information. Square D. Co.

64—CHECK VALVE improves system characteristics

Where line surges and drop-back present a problem in fluid systems, performance can be improved by these check valves, says manufacturer. Spring-actuated, the internal disk

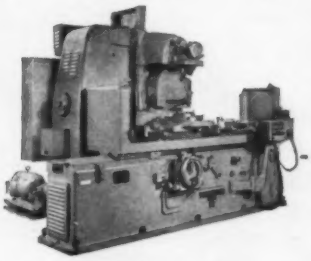


closes as flow ceases and does not depend on reverse flow for shutoff. According to company, this eliminates damaging surges of fluids, back-drop, and false registry on meters, as well as the need for anti-hammer devices. Easy installation and low maintenance reported for these levels are attributed to bearing guides on both sides of the disk and a full flow area that exceeds the pipe area. The valve is designed to operate in any position. Standard sizes are 2 to 18 in.; pressures to 2500 psi. Combination Pump Valve Co.

65—CURING AGENT contains no resins or waxes

Emeri-Crete Kure is a non-resinous sodium silicate compound that cures newly laid concrete and hardens it by converting free lime to calcium silicate, at the same time preventing excessive air drying. The product is said to be ideal as a curing agent for areas that must be covered with resilient floor

Thompson Precision Surface Grinder, Type C



Thompson Grinders are world famous for accuracy. Their precision depends to a great extent, on the smooth running R & M hydraulic pump drive motors and the motor parts in the spindle head. Since even slight vibration in a precision machine tool destroys fine surface finish, Thompson engineers have wisely chosen R & M Motors because of dependability and running smoothness.

Freedom from vibration in a motor depends upon the physical balancing of moving parts and also the elimination of torque impulses set up in the windings. All R & M rotors are balanced to have less than .000025 inches of vibration amplitude and torsional vibration is eliminated by designing the windings for balanced magnetic symmetry.

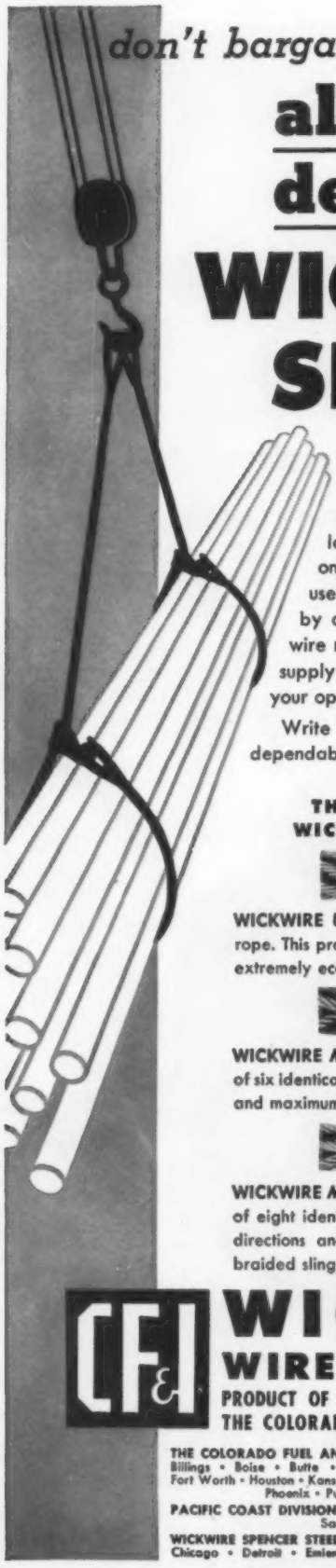
If your application requires smoothness, dependable performance and is within the limits of 1/200 to 200 H.P. contact your R & M representative, or write for Bulletin 520-PE

motor balance boosts Thompson precision!

ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO | BRANTFORD, ONTARIO

For more facts circle 641 on Reply Card



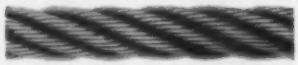
don't bargain with safety

always use dependable WICKWIRE SLINGS

The cost of a wire rope sling is so small, yet a single failure can cause thousands of dollars in damage . . . and endanger everyone on the job site. So don't take chances. Always use Wickwire Wire Rope Slings—they're made by one of America's oldest and most trusted wire rope manufacturers . . . and Wickwire can supply you with the type of sling that's best for your operations.

Write today for complete details about safe, dependable Wickwire Wire Rope Slings.

THREE POPULAR TYPES OF WICKWIRE WIRE ROPE SLINGS



WICKWIRE *UNIFLEX*® SLINGS—Each leg is a single wire rope. This provides a high "strength-to-weight" ratio and is extremely economical.

WICKWIRE *MULTIFLEX*® SLINGS—Each leg is a flat braid of six identical wire ropes. This gives a large bearing surface and maximum unidirectional flexibility.

WICKWIRE *MAXIFLEX*® SLINGS—Each leg is a round braid of eight identical wire ropes. It is extremely flexible in all directions and is the most widely used of all types of braided slings.

5234

CF&I **WICKWIRE WIRE ROPE SLINGS**

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION — Albuquerque • Amarillo Billings • Boise • Butte • Casper • Denver • El Paso • Farmington (N. M.) Fort Worth • Houston • Kansas City • Lincoln (Neb.) • Odessa (Tex.) • Oklahoma City Phoenix • Pueblo • Salt Lake City • Tulsa • Wichita

PACIFIC COAST DIVISION — Los Angeles • Oakland • Portland • San Francisco San Leandro • Seattle • Spokane

WICKWIRE SPENCER STEEL DIVISION — Boston • Buffalo • Chattanooga Chicago • Detroit • Emlenton (Pa.) • New Orleans • New York • Philadelphia

For more facts circle 642 on Reply Card

NEW PRODUCTS

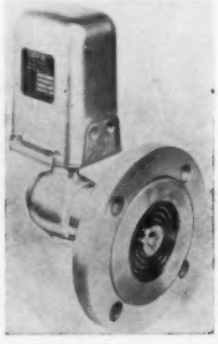
(Begins on page 192)

covering, since many resin or wax membrane cures interfere with proper mastic adhesion. It contains a powerful detergent that penetrates floor surface to seal porous concrete against evaporation. Hardening action on Portland cement binder prevents dusting, company says.

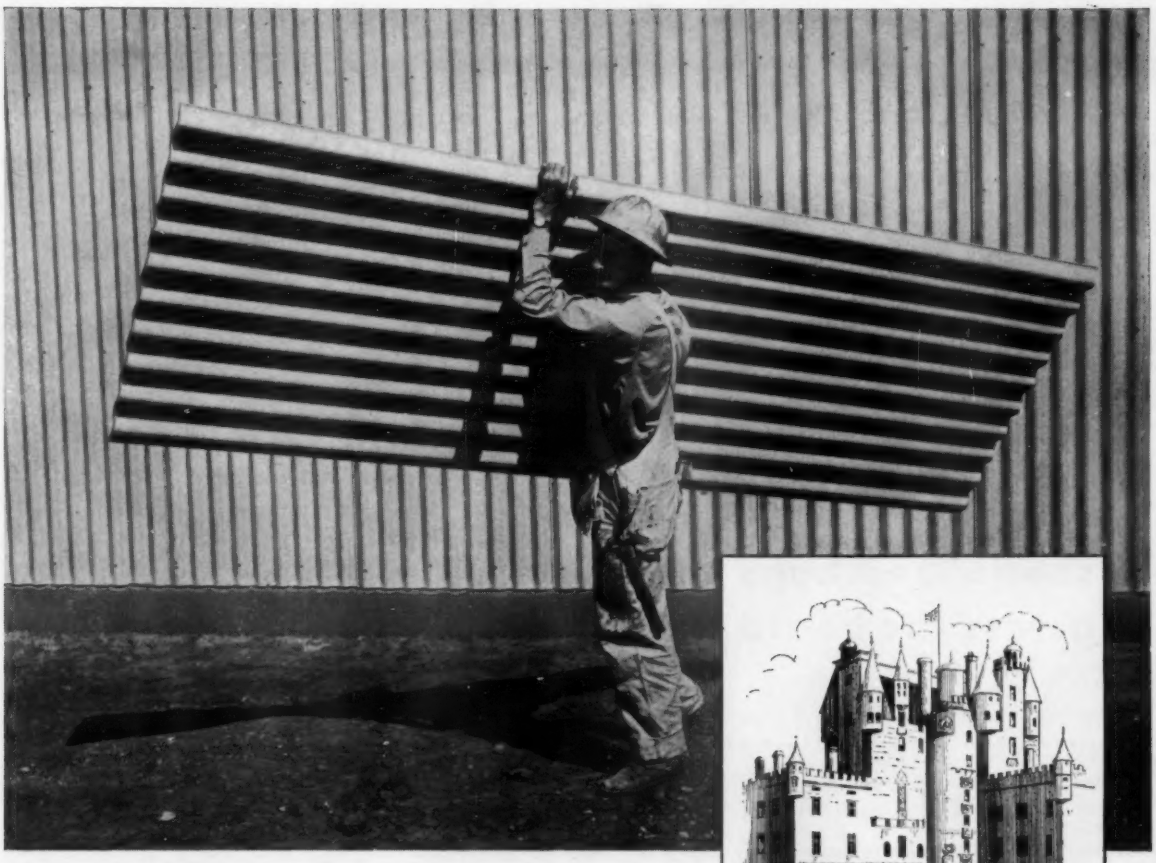
Applied to freshly placed concrete directly from shipping containers, one application, at the rate of 500 sq ft per gal, cures and hardens at the same time. Solution can be applied at rapid rate and will not gum-up hand or power spray equipment manufacturer says. Power spray application is recommended, although hand spray, hair broom or burlap drag may be used. This cure can be cleaned from equipment by water rinsing, for it is soluble until it sets for 48 hr. Walter Maguire Co., Inc.

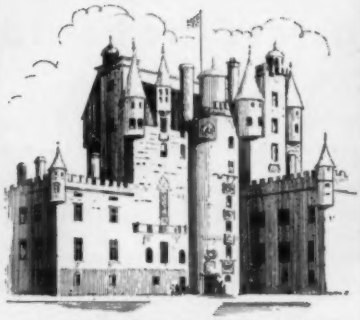
66—INSTRUMENT measures viscous fluid levels

The Type 13 FA d/p Cell Transmitter is a differential pressure liquid level transmitter which mounts directly on a tank nozzle to provide a simple method for measuring viscous or slurry-type liquids in open or closed vessels. It operates on the forced balance principle and is said to maintain



calibrated accuracy over a wide range of ambient conditions. The level measuring element — a silicone-filled diaphragm capsule — is assembled in a 3-in. flange for flush mounting on the side of a vessel. Head of liquid in the vessel applies force to the high pressure side of the capsule which is opposed by force on the low pressure side. The latter may be open to atmosphere for measurement of open tank level. Or it may be connected by piping to top of a closed tank to balance out static pressure. Adjustable range suppression and elevation springs can be attached. The pneumatic output of the transmitter — a 3-15 psi signal proportional to tank level — will op-





Constructed of stone in 1675-87, Glamis Castle in Scotland has withstood the ravages of weather and time. Glamis is the ancestral home of Queen Elizabeth of Great Britain.

Build years of service into roofs and walls

Johns-Manville Corrugated Asbestos Transite wears like stone

For durability, Corrugated Transite is one of the most lasting building materials ever developed. Made of two practically indestructible minerals—cement and the ageless rock, asbestos—Transite looks and wears like stone. Like the famous old stone castles, original installations of Corrugated Transite are still giving service and protection under conditions which destroy other forms of roofing and walls.

Corrugated Transite can't burn, can't rot, can't rust. It has high resistance to acids, to gaseous fumes, to severe temperatures, to vermin and insects.

You save money on maintenance. Corrugated Transite requires no painting, no preservative treatment. It provides maintenance-free construction.

Corrugated Transite offers a way to save money on new construction and remodeling. The large sheets are low in first cost . . . require no special tools for application . . . can be installed quickly and easily over skeleton frame construction . . . are 100% salvageable.

For more specific information, write Johns-Manville, Box 158, New York 16, N. Y. In Canada: 565 Lakeshore Rd. East, Port Credit, Ont.

THE AMERICAN INSTITUTE OF ARCHITECTS 1857-1957

Johns-Manville congratulates the American Institute of Architects on its 100th Anniversary.

—Consult an architect—use quality materials.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

For more facts circle 643 on Reply Card

Here's how *Snap-on* provides specialized hand tool service across the board for industry

Production... *Snap-on* offers a complete range of wrenches, sockets and specialized tools for product assembly.

Original Equipment... *Snap-on* makes up custom-built tool kits to be included with new products shipped from the factory.

Maintenance... *Snap-on* provides maintenance tools for servicing anything from plant facilities and machines to every type of vehicle.

Field Service... *Snap-on* assembles special field-service tool kits for repairing everything from diesel engines to business machines and appliances.

Plus *Snap-on* Personal Service

Snap-on Sales Engineers work closely with industry to cut costs, keep production on the move. Here are a few examples:

Now revamping one company's entire tool crib setup (year-long project).

Put *Snap-on* engineer right on electronic assembly line to design special pliers.

Spent weeks on excavator assembly line to provide special tool kit.

Same as above on diesel engine assembly line.

Continually providing special long-life impact sockets on dozens of assembly lines.

Whatever *your* tool problem, *Snap-on* can render a specialized service. Branch offices and warehouses are located in key industrial centers throughout the U.S. and Canada. Write us or call your nearby *Snap-on* representative.

SNAP-ON TOOLS CORPORATION
8068-I 28th Avenue • Kenosha, Wisconsin

For more facts circle 644 on Reply Card

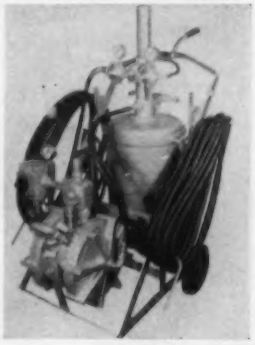
NEW PRODUCTS

(Begins on page 192)

erate a remote indicator, recorder, or controller, it is noted; no auxiliary signal is needed. The Foxboro Co.

67—HOT SPRAY UNITS adapted to maintenance

The Chieftain series of hot spray heaters combine heater and reciprocating pump in a portable unit which carries a 5- or 10-gal container. It is designed for industrial and maintenance painting requirements where

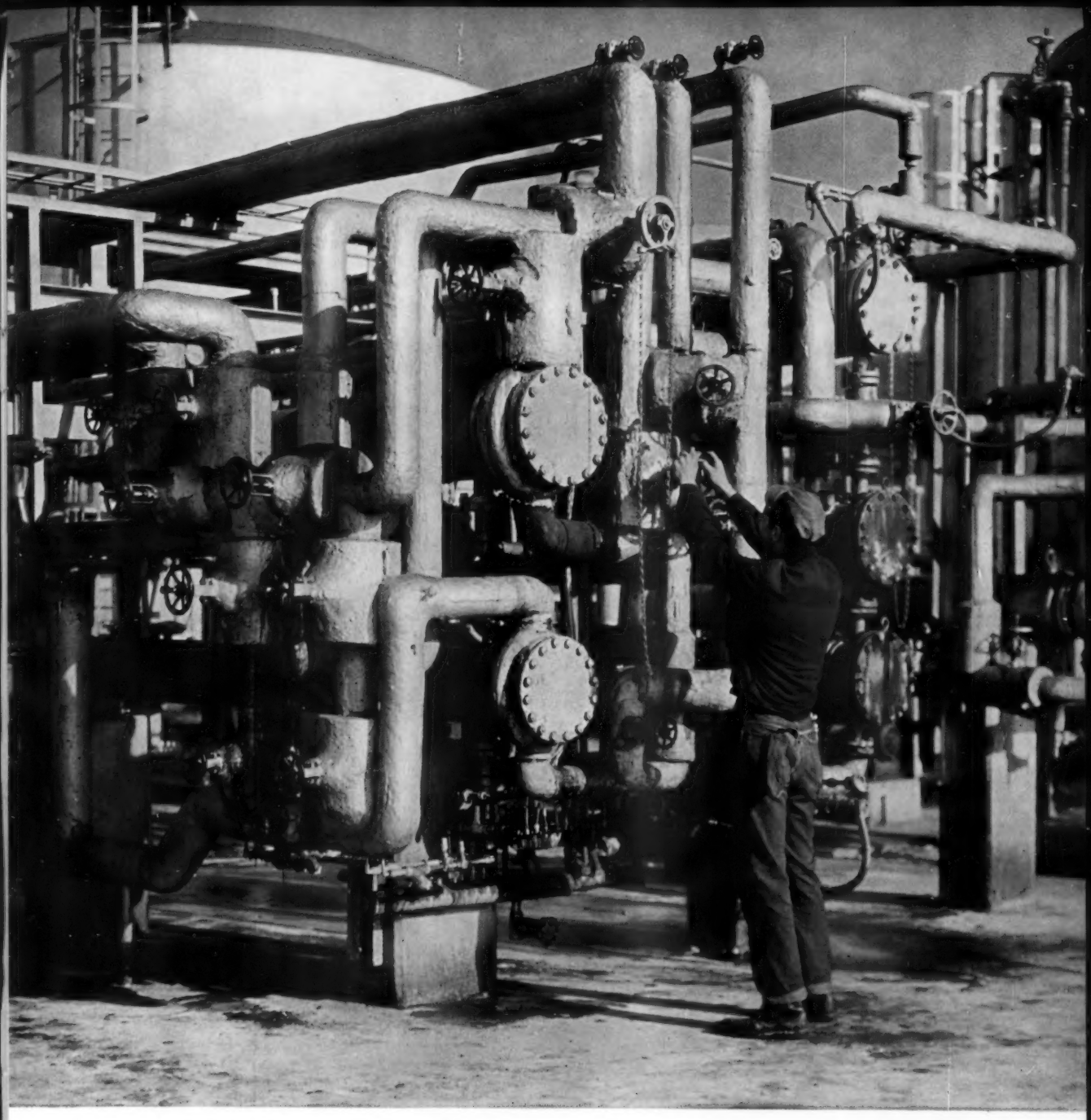


long hose lines and portability are required. These units meet these requirements by providing hot spray temperatures for one or two guns and on hose lines up to 75 ft long. Circulation from heater to gun is maintained for temperature control. The operator selects the paint temperature by simply turning the Dial-a-Matic controller. A single air and electrical connection places the spraying system in operation. Two models in the series have a 2 kw or a 3 kw heater and a pump designed to spray up to 1 gpm. (A larger size model offers a similar assembly on a four-wheeled cart and carries a 55-gal drum.) Spee-Flo Co.

68—HIGH STRENGTH ALLOY for elevated temperature

The X5454 High Strength Alloy was developed especially for welded aluminum structures which must operate at moderately elevated temperatures. Alloy X5454 is claimed to provide maximum strength for aluminum applications exposed continuously or intermittently to temperatures in the 150 to 300 F range—under these conditions, it displays high resistance to corrosion and stress corrosion in all temper specifications. There are no restrictions on the extent of cold forming, company says. Welding characteristics are said to be excellent. Best results for all thicknesses are gained with welds applied by inert gas shielded consumable arc method. The

For more facts circle 645 on Reply Card →



Easy way to keep tall oil moving: Aloyco jacketed valves

You're looking at a portion of the recently completed tall oil fractionation plant Foster Wheeler built for Union Bag-Camp Paper Corporation near Savannah, Ga.

The jacketed Aloyco stainless steel valves (with red hand wheels) get quite a workout in the two stage fractional distillation process here. Rosin and an intermediate fatty acid are produced in the first stage. Then the fatty acid is rerun through the main fractionating tower to produce a refined product for the manufacture of high grade alkyd resins, processing oils, soaps and chemical intermediaries.

Completely jacketed Aloyco valves are designed to ease handling of tars, tar oils, rosins and other materials difficult to move at room temperature.

Aloyco's integrally cast, completely jacketed valves insure long life and low maintenance in high temperature corrosive service. For more information, write Alloy Steel Products Co., 1301 West Elizabeth Ave., Linden, N. J. 71

ALLOY STEEL PRODUCTS CO., LINDEN, NEW JERSEY

Dracco *Airstream* Conveyors

lead the way in modern bulk handling

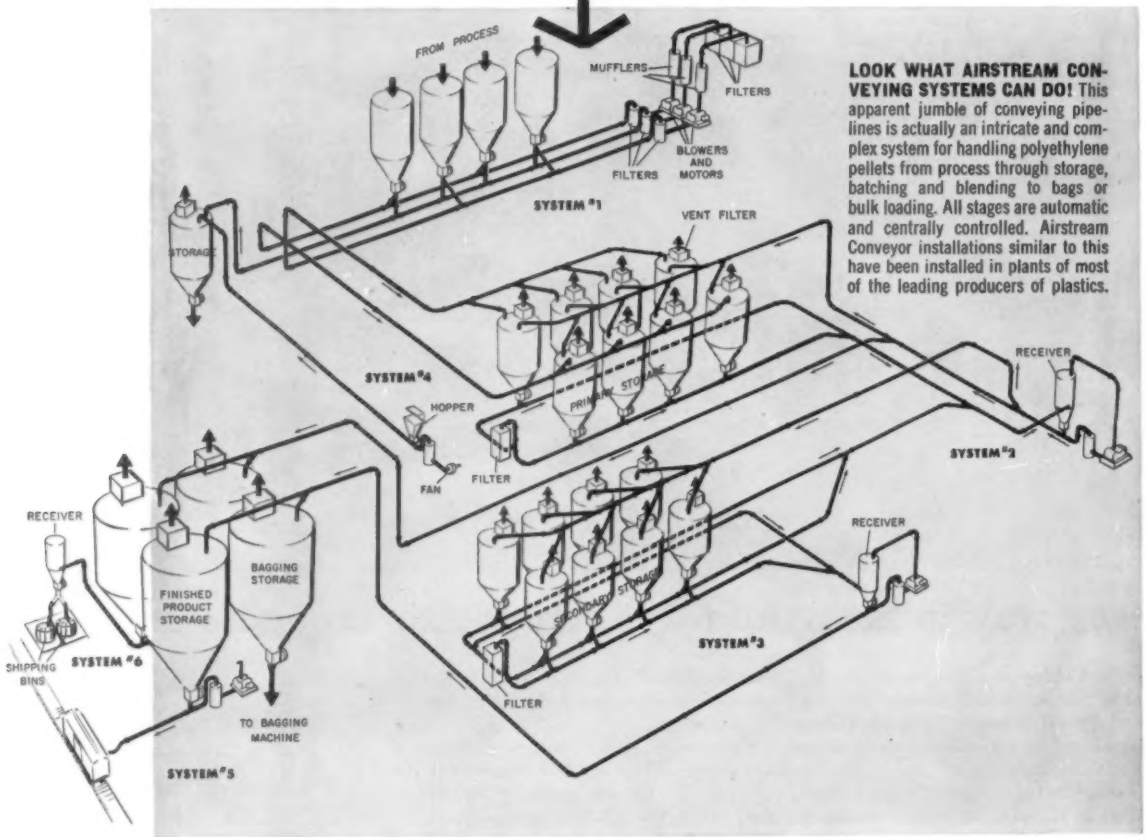
► *Dracco Airstream Conveyors are the most advanced way to handle bulk materials. They are superior in contamination-free conveying of pure materials . . . gentle handling of friable materials . . . adaptability to automatic control . . . savings in labor, maintenance and material costs . . . installation flexibility . . . cleanliness, inside and out.*

Today's Airstream Conveyors literally bring profits to your fingertips. Push-button controlled by one man, they move bulk materials swiftly and automatically through smooth-walled pipelines to any corner of the plant, or between plants. Diagrammatic arrangement of controls enables the operator to see at a glance all conveying paths in use and material levels in bins. Many operations can be performed: unloading, storing, reclaiming, blending, weighing, distributing and bulk loading.

These are not predictions of things to come, but are actual realities available from Dracco today. Companies planning automation of processes involving bulk materials should investigate handling the Dracco way. New Bulletin No. 530 gives full details. Write for your copy today.

DRACCO CORPORATION

4035 East 116th Street • Cleveland 5, Ohio



LOOK WHAT AIRSTREAM CONVEYING SYSTEMS CAN DO! This apparent jumble of conveying pipelines is actually an intricate and complex system for handling polyethylene pellets from process through storage, batching and blending to bags or bulk loading. All stages are automatic and centrally controlled. Airstream Conveyor installations similar to this have been installed in plants of most of the leading producers of plastics.

DRACCO *airstream* conveyors
dust control equipment

For more facts circle 646 on Reply Card

BENJAMIN

...always the source of good lighting...anywhere in the plant!

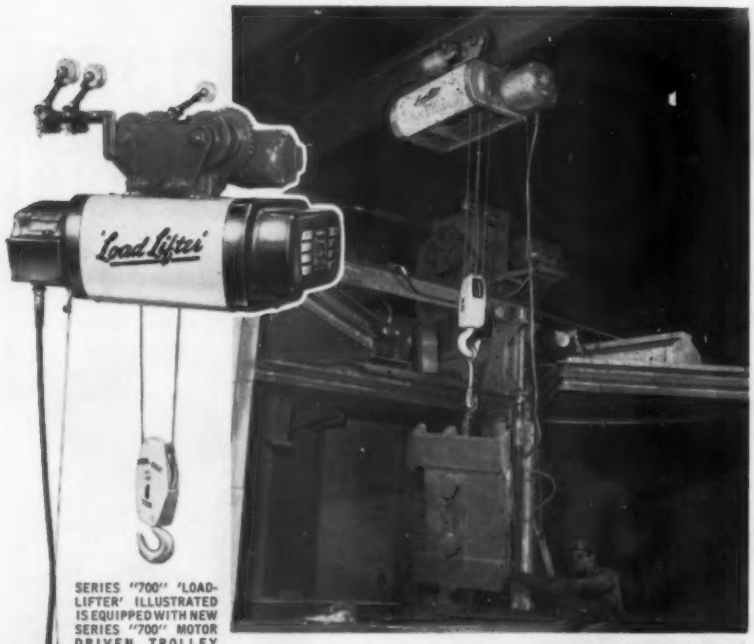
If you could look at your factory with the roof off like this you'd get an idea of the many different lighting units it takes to provide the right light for every seeing task. When you specify BENJAMIN you are assured of a specially-engineered unit for every factory and office location—designed for better seeing with maximum eye comfort.

Send for illustrated data bulletins on any or all of the units shown here. Benjamin Electric Mfg. Co., Dept. PE, Des Plaines, Illinois

1. Explosion-Proof Units
2. Vapor-Tight Incandescent
3. Triple-Flo Continuous Lines
4. Stream-Flo Continuous Systems
5. Stream-Flo w/27° Shielding
6. RLM Dome Reflectors
7. Stream-Flo w/Plastic Covers
8. Elliptical Angle Reflectors
9. Steelite Armor-Clad Units
10. Twin-Flo Individual Units
11. Symmetrical Angle Units
12. Semi-Direct Industrial w/25% Uplight
13. Twin-Flo w/10% Uplight
14. Panel-Glo Safari Systems
15. Stock-Bin-Lite
16. Officer Louvered Units
17. Panel-Glo Corrugated Systems
18. Glass-Enclosed Troffers
19. RD Projectors
20. Duo-Service Floodlights

R-133R

For more facts circle 647 on Reply Card



SERIES "700" 'LOAD-LIFTER' ILLUSTRATED IS EQUIPPED WITH NEW SERIES "700" MOTOR DRIVEN TROLLEY

HUSKY 'LOAD LIFTER'

LIFTS 1 TON
1 FOOT
IN 1 SECOND

Production economy demands top-quality hoists that are fast, rugged, safe and easy to maintain. You get all four essentials in the Series "700" 'Load Lifter' Electric Hoist.

The Series "700" 'Load Lifter' speeds load handling on every job. With only 24 volts at the push buttons, the operator is safe. It has a load brake and a motor brake. The full load can be held safely by either brake *alone*. Braking action is fast and safe. The load can't drop back. Accurate spotting is never a problem.

The Series "700" 'Load Lifter' Electric Hoist is built extra tough to stand up in the toughest services. Every moving part is engineered and manufactured to function smoothly and without needless wear. Safety construction and safety devices provide complete protection against operational hazards. The hoist can be inspected and serviced *in the air*, without removing the load. Capacities range up to 15 tons. Single and two-speed models available with your choice of suspension. *Get details from your "Shaw-Box" Distributor or write us for Bulletin 410.*

56G-4R

'Load Lifter'® ELECTRIC HOISTS

MANNING MAXWELL & MOORE INC. M&M TRADE MARK

MANNING, MAXWELL & MOORE, INC.
SHAW-BOX CRANE & HOIST DIVISION
362 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.

For more facts circle 648 on Reply Card

NEW PRODUCTS

(Begins on page 192)

inert gas tungsten arc method can be used on thicknesses up to ½ in. Tensile strength of arc welded joints is said to be equal to tensile strength of alloy in the annealed temper. Aluminum Co. of America.

69—FLEXIBLE SHAFT has equal torque both ways

Features announced for this flexible link shaft include equal torque in both directions, unlimited length and equal flexibility in all sizes from ⅜- to 3-in. diam. It is declared suitable for remote controls and power drives. The

links consist of trunnion blocks and two half links fastened together with screws or rivets. A variety of cover materials are available including Neoprene hose, non-metallic hose or semi-rigid tube. End fittings are available as required. Minimum link length is three times the diameter and various link lengths can be combined in one shaft using long links for straight runs. Long life is said to be a characteristic of this shafting. It is described in an illustrated booklet, "A New Long Arm for Industry." Clark Flexible Link Shaft Co.

Use the Reader Service Cards provided on pages 277-278 to ask for more information on these products. Circle item numbers of products in which you are interested.

70—HUMIDITY CONTROL maintains air stream level

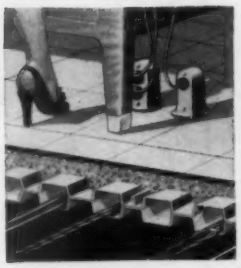
The Humitrol maintains relative humidity level within ± ¼ per cent in an air or gas stream, manufacturer states. The unit is composed of a sensing element, control system and modulating device, all integrally mounted, and is for use in conjunction with dehumidifiers, humidifiers and air conditioning equipment. It comes in sizes from 20 cfm up. The control point is set by a calibrated knob. Operating over a wide temperature span, the Humitrol is claimed accurate in a 3 to 98 per cent relative humidity

For more facts circle 649 on Reply Card →

(Above) Demonstrating with a large sample section, Pennsylvania Bell Telephone Company School instructor explains to technician-students the basic principles of Q-Floor wiring. (Right) Members of the Q-Floor class become familiar with the product's advantages by wiring an actual installation in the classroom.

Q-Floor . . . a Required Subject at this School

Every year, an estimated 1,600 Bell Telephone Company of Pennsylvania technicians attend a special school near Harrisburg, Pa. to learn the latest practice in line and equipment installation. Bell feels that cellular steel subflooring is so important that an entire classroom is devoted to the subject of Q-Floor wiring. Here the students learn by working with an actual Q-Floor installation that wires can be pulled and telephone or electrical outlets established often in a matter of minutes, and that every six-inch area of the entire floor is available for outlet use. This flexibility, so graphically pointed out to Bell students, plus substantial savings in construction time and money has influenced owners and architects all over America to provide for the future by building with Q-Floor today. Use the coupon to write for literature.



With Q-Floor performing its dual function of a structural subfloor and as a close-module underfloor wiring distribution system, building owners, designers and contractors benefit from construction speed, convenience and complete wiring flexibility.

Today's finest buildings are built with **Robertson**

Q-Floor

The STANDARD sub-floor construction for modern buildings

H. H. Robertson Company

2419 Farmers Bank Building, Pittsburgh 22, Pa.
In England—Robertson Thain Ltd., Ellesmere, Cheshire
In Canada—Robertson-Irwin Ltd., Hamilton, Ontario • Edmonton, Alberta

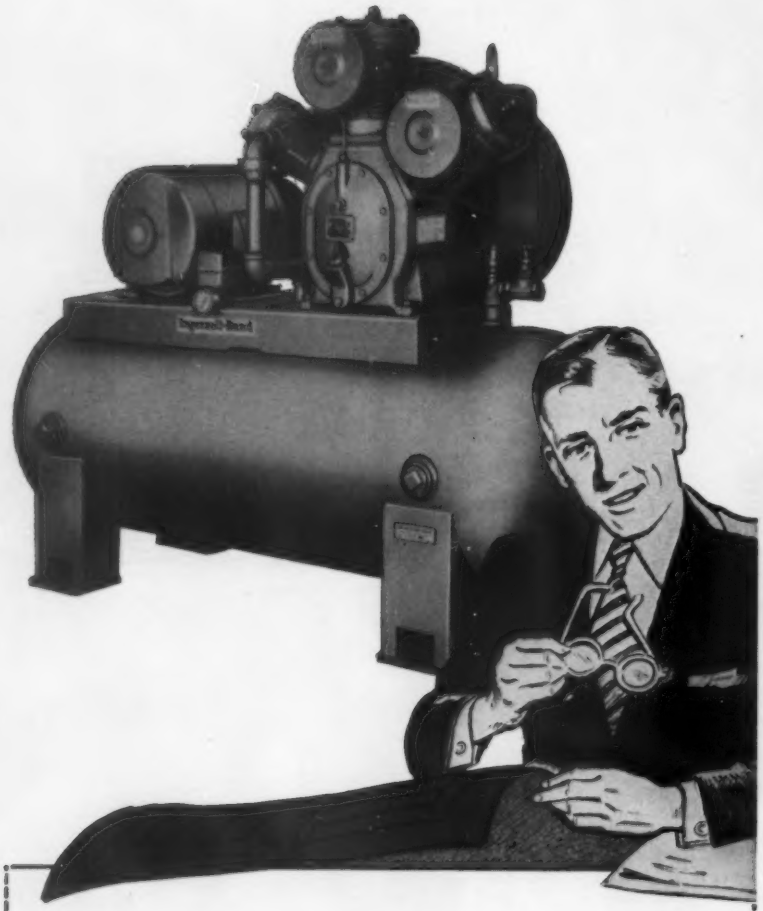
Please send 44-page Q-Floor Manual.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____



"... the compressor is an Ingersoll-Rand

Our daily plant production is totally dependent upon air power. We can't afford a shut-down. We must have the most dependable air compressor that we can buy."

Ingersoll-Rand
11 Broadway, New York 4, N.Y.

PACKAGED AIR-COOLED COMPRESSORS,
½ through 20 hp

3-461

For more facts circle 650 on Reply Card

NEW PRODUCTS

(Begins on page 192)

range. Applications include freon handling operations, drug processing, industrial process control and industrial installations where a flow of constant humidity air or gas is required. Universal Dynamics Corp.

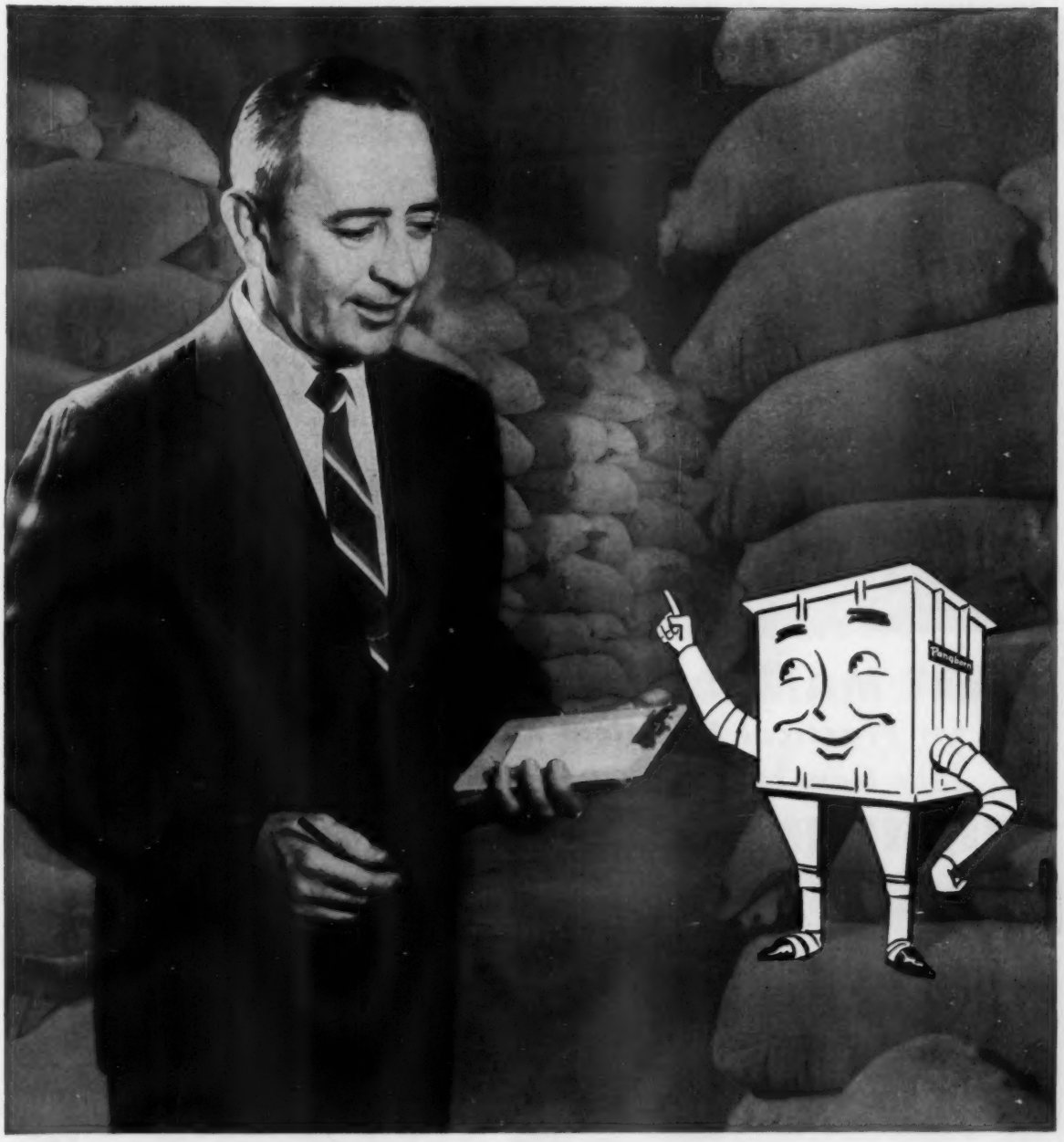
71—BELT CONVEYOR takes up the ferrous loads

This magnetic belt conveyor is designed to transport ferrous loads at angles to 90 deg. In handling steel tote boxes and ferrous parts or products, unpackaged or in paperboard containers, the belt's steep angle of inclination saves on floor space. It is also

reported to eliminate transferring cartons onto pusher bar boosters. In operation, loads are carried on a thin, rough-surface belt which slides over a metal bed containing permanent Alnico magnets. The magnetic attraction of these continuous metal strips holds the load on the belt. Because the belt must be slack to conform to the lower vertical curve, manufacturer has engineered a drive consisting of a right angle gearhead motor with roller chain drive to this conveyor headshaft. The Alvey-Ferguson Co.

72—CHEMICAL COSMETIC restores marble sheen

Marbl-Lus is announced as a professional formula for correcting the tendency of polished marble to lose its original sheen and color due to an affinity to film-forming air-borne particles. Already in use by fabricators of marble-topped fixtures, this liquid chemical/waxer does not require skilled application, company points out. It is wiped on or sponged on, allowed to haze-dry, and then removed with hand cloth or buffer. Special solvents act to remove anchored surface soil and film, re-exposing the original beauty of the marble. The formula



"You mean $15,000 a year salvaging dust?"

That's just what we mean! Many of our customers are clearing $15,000 a year and more from valuable material reclaimed by Pangborn Dust Control. Efficient Pangborn Dust Collectors trap dust at the source, gather it ready for resale, re-use or disposal. As a matter of fact, users of Pangborn Dust Control have made $20,000, $36,000, even $75,000 a year in salvaged dust, depending on the value of the dust collected.

What's more, Pangborn gives you other benefits of lower housekeeping costs, longer machinery life, higher employee efficiency and better employee and community relations. And Pangborn offers a complete line of collectors for all jobs.

Why not discover how you can profit from Pangborn Dust Control? Write for Bulletin 922 to PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control & Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

For more facts circle 651 on Reply Card

FREE MANUAL

for Practical Electrical Men Tells How to Use the Popular

MEGGER® INSULATION TESTER

The Meg type of Megger insulation tester shown above is perhaps the most popular and most-used tester there is. It is available with a hand-crank generator for field use and with a separate or built-in power supply for repetitive inspection or production tests. Ranges available up to 2000 megohms, 1000 volts d.c. Optional accessory features include ohm scales 0 to 10,000 ohms and ratio and discharge switches.

The answers to many of your electrical maintenance problems are in the 100-page "Manual on Megger Insulation Testers". It answers questions like these:

What makes good insulation go bad?
How can you check it before it breaks down?
How does a Megger insulation tester work?
What testing procedures should be practiced?
How to interpret meter readings?
Does periodic testing pay off?

Write now on your company letterhead for this valuable manual together with helpful material on the practical and economical advantages of electrical preventive maintenance.

Write for BULLETIN 21-PL

8703

JAMES G. BIDDLE CO.

• ELECTRICAL TESTING INSTRUMENTS
• SPEED MEASURING INSTRUMENTS
• LABORATORY & SCIENTIFIC EQUIPMENT

1316 ARCH STREET
PHILADELPHIA 7, PA.

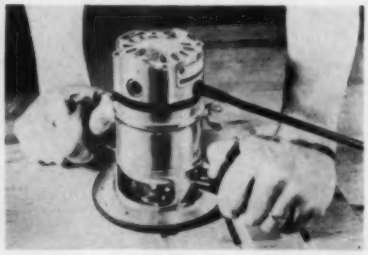
NEW PRODUCTS

(Begins on page 192)

also serves to "plate" the refreshed surfaces with a tough, dry armor of imported wax. Manufacturer recommends it for any polished marble surface except floors, and says it can be used on non-porous tile, terrazo and alabaster. A gallon of Marbl-Lus costs around $8.00. Document House.

73—HEAVY-DUTY ROUTER does intricate work

This 1-hp router, designed to perform intricate joinery and cabinet work, has a micrometer-type depth adjustment. It operates by direct drive, and speeds range to 22,000 rpm. Features announced include heavy-duty ball-bearings, permanently lubricant sealed, and

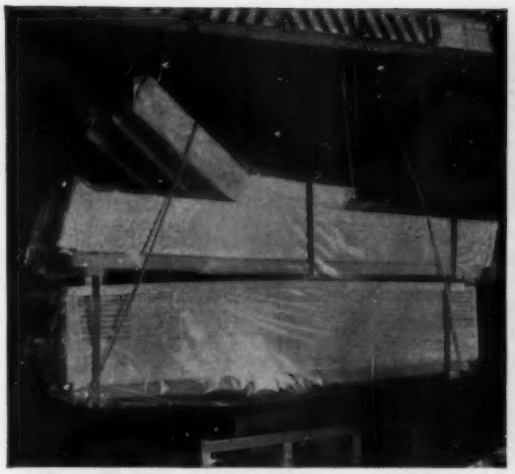


a positive grip collet-type chuck. Two wrenches are supplied for tightening the chuck. Contributing to ease of handling is a die-cast end cap providing a level top to support the router in an inverted position—leaving operator's hands free. Side handles, set low on base for balance, are large and comfortable, company notes, and the toggle switch is placed so the router can be operated without removing hands from the handles. A large sub-base is predrilled to accommodate special fixtures. The router weighs 7 lb. The built-in micrometer-type depth adjustment is calibrated for 0 to 1 in. in 1/64-in. graduations, with a total vertical feed of 1½ in. A rack and pinion support is used for uniform vertical adjustment. The Black & Decker Mfg. Co.

74—ROOF VENTILATOR has safety damper opener

As a fire safety factor for modern one story industrial plants, utilizing sprinkler systems, a safety vent emergency damper opener has been made an integral part of this company's high-velocity power roof ventilator. The unit, which is independent of fan operations, serves to allow smoke and fumes, normally trapped, to escape—permitting faster access to the area by fire fighters. Operating on the

For more facts circle 652 on Reply Card



BUILDINGS AWEIGH! One of the nation's largest makers of prefabricated steel buildings speeds up production with Tuffy Slings. High flexibility makes Tuffy Slings conform perfectly to irregularly shaped load contours and sharp corners, and snug down smoothly in a choker hitch. Handling and rigging time is cut to the bone. Photographs show heavy loads of steel sheathing panels and steel structural members of prefabricated buildings being handled by Tuffy Slings.

Extra Strength Teams Up With Extra Flexibility in Tuffy® Slings for Fastest Handling of Heavy Loads

How Tuffy Took the Cussedness Out of Slings

Regular-construction wire rope such as the 6x19 or 6x37 will give you the strength you need in sling work. But it makes an ornery kind of sling—stiff to handle, quick to kink and loop, subject to serious damage when bent around small radii and sharp corners.

Tuffy Slings are a different story. They behave beautifully—because they combine the strength of steel with the flexibility of a smooth-flowing fabric. Yet with all this tranquility of disposition, you can't beat Tuffy for taking shock and impact loads.

It's Almost Impossible to Kink a Tuffy Sling. Try it!

With the help of a vise, you might succeed. But you'll find the kink smooths out with hardly a trace of damage. Tuffy's machine-braided fabric won't take a "set" or deformity under the toughest of ordinary working conditions.

Get your FREE Tuffy Sling Handbook

Gives full data on Tuffy Sling types, dimensions, weights and rated loads. Plus a complete rigger's manual and engineer's notebook on wire rope constructions and specifications. Write for your copy now.

Tuffy Pressed-On Ferrule Gives Eye-Splice Full Fabric Strength

Applied under tremendous pressure, the steel ferrule literally flows into every space between wires and strands. The friction force created gives the eye splice 100% of fabric strength. And the streamlined Tuffy ferrule leaves no openings or rough projections to snag or injure hands.

"Double the Service Life of Ordinary Slings..."

That's what one of the nation's big steel corporations reports on the use of Tuffy Slings in their mills. We have a growing stack of similar testimonials from every area of industry where Tuffy Slings and Hoist Lines are used.

Your Tuffy Distributor is a Good Man to Know

He'll help you save money with the longer trouble-free life of Tuffy Slings. He's always ready with what you need—the exact Tuffy Sling or Union Wire Rope for your requirements. He's not only well-stocked for your scheduled-replacement or emergency orders; he's backed by his nearby Union Wire Rope mill depot.

union Wire Rope corp.

Specialists in high-carbon wire, wire rope, braided wire fabric, and stress-relieved wire and strand. (5)

2272 Manchester Avenue **Kansas City 26, Missouri**

For more facts circle 653 on Reply Card

NEW Faultless
DOUBLE BALL BEARING
SCAFFOLD CASTERS
Featuring Simultaneous Swivel and Wheel Locks

C900 STEM TYPE CASTER

Machined steel stem, 1⅜" diameter by 3⅝" long. Held securely in tubing by pinning through tube and ⅝" diameter hole in stem. Caster can be easily removed from tubing when necessary. For use on platforms, workstands, scaffolding or other items made of tubing.

To assure safe and positive handling of mobile equipment holding workmen, Faultless engineers have produced the most efficient method of applying dual locks ever offered for this important service. The Series C900 Swivel Stem and CP900 Swivel Plate Casters combine the famous (1) Faultless Double Ball Bearing Swivel, and (2) instantaneous locking protection of dual, quick-action brakes. Faultless, thus offers the ideal Caster for industrial, military and construction equipment.

For further information on the Series C900 and CP900 Casters ask your nearby Faultless Industrial Distributor for Faultless Bulletin No. 6957. He also maintains a substantial inventory of Faultless Casters for immediate delivery. Call him today.

FEATURES OF DESIGN

1. SWIVEL TOP PLATE . . . deeply serrated on outer edge to assure strong, positive contact with brake.

2. SWIVEL BEARING . . . two complete rows of hardened, ball bearings rolling in smooth, hardened and lubricated raceways.

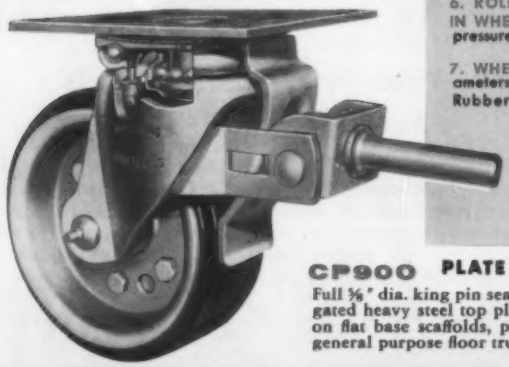
3. BRAKE ASSEMBLY . . . Heavy gauge, hardened, serrated steel brake shoe, guiding tabs, cam and lever. Brake lever arm is in "down" position when brake is "off" . . . no danger of brake engaging when equipment is moved. Cam assures 100% brake shoe contact, compensates for wheel wear. Positive and effective braking of both swivel and wheel.

4. THRUST BEARING . . . raceway is machined from bar stock and fully hardened. Ball bearings are held in perfect alignment with hardened steel ball retainer.

5. GREASE FITTING . . . Positive, thorough lubrication of swivel and load bearings.

6. ROLLER OR BALL BEARINGS IN WHEEL . . . Lubricated through pressure fitting in axle bolt head.

7. WHEELS . . . 5", 6", and 8" diameters available with Renewable Rubber Tires, Ruberex cushion tread, Rockite hard tread, Plaskite and Semi-Steel. Drawn Steel Wheel also available in 5" and 6" diameters.



CP900 PLATE TYPE CASTER

Full ⅜" dia. king pin seats well below level of corrugated heavy steel top plate. An ideal Caster for use on flat base scaffolds, platforms, racks, stands and general purpose floor trucks.

FAULTLESS CASTER CORPORATION
EVANSVILLE 7, INDIANA
Offices in Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Dallas, Detroit, Greenville, S. C., Grand Rapids, High Point, Indianapolis, Los Angeles, New Orleans, New York, Philadelphia, Portland, Seattle, St. Louis. Canada: Stratford, Ontario.

For more facts circle 654 on Reply Card

NEW PRODUCTS

(Begins on page 192)

principle of heat actuation, this unit is automatic in that it uses no electrical devices, wiring, thermostats, or counterweights. It is controlled by a spring, outside the air stream of the fan, which is held in tension by a fusible link. Excessive heat breaks the link, which releases the spring raising the dampers. This spring is shielded from flames by the damper blades, it is pointed out, and prevents annealing, tension loss. Chicago Blower Corp.

75—RUBBER DOORS confine smoke, fumes, odors

Flexidors are all rubber, double batten doors for confining smoke, fumes, odors, noise and conditioned air. The doors are described as flexible, self-closing and tear resistant. They are designed to keep air conditioned rooms cool in summer, and heated rooms

warm in winter, while affording quick and easy passage in and out of areas exposed to heavy traffic. They are reported to withstand indefinitely the battering of power operated trucks and to take repeated abuse from off-center impact and corner cutting of mechanized equipment. Each pair of doors hangs from two-way gravity cam hinges. They are mounted so the lower half of the doors is free swinging and capable of absorbing impact of low freight loads. When handling equipment hits either door, the bottom flaps out, letting bulk through. Jamison Cold Storage Door Co.

76—PILOT AIR VALVE offers longer service life

Designed to eliminate a chief cause of wear in pilot air valves, the Flo-Pilot Valves incorporate a small, synthetic rubber boot which snaps in place around the valve stem, sealing critical parts from dirt and abrasives. Aluminum stainless steel and molded nylon are used to give the valve longer

SLICK INSIDE

TOUGH OUTSIDE

for superior fishing...permanent zinc protection

XDUCT RIGID STEEL CONDUIT listed by UNDERWRITERS' LABORATORIES, INC.

National Electric Products

PITTSBURGH, PA.

2 Plants • 12 Warehouses • 41 Sales Offices

For more facts circle 655 on Reply Card

CUT YOUR OVERHEAD

in materials-handling problems with

Æ ELECTRIC CUSTOMIZED

LO-HED HOISTS

- Cuts overhead space requirements
- Five classes lift ¼ to 12 tons
- Five suspensions available
- Four types of controls
- Shrouded bottom block
- Two automatic brakes
- Anti-friction bearings throughout
- One-hand operation
- Full load tested

Write for literature describing the Customized Lo-Hed Hoist or the pace-setting AE Standard Lo-Hed, available in 2- and 3-ton capacities —the latest word in modern hoist engineering and materials.

AMERICAN ENGINEERING COMPANY

Dept. H-164, WHEATSHEAF LANE & SEPVIVA ST., PHILADELPHIA 37, PA.

Canadian Subsidiaries: Affiliated Engineering Corporations, Ltd., Montreal, P. Q. . . . Bawden Industries Ltd., Toronto, Ont.

AE Products are: Taylor, Perfect Spread and Vibra-Grate Stokers, Hole-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers, Marine Deck Auxiliaries.

For more facts circle 656 on Reply Card

NEW PRODUCTS

(Begins on page 192)

service life by providing resistance to corrosion. The basic valve has five optional actuating heads: palm button, ball cam, lever, locking lever, and mechanical link clevis. These are readily interchangeable by removing two pins. Any of these valves can be base, panel or wall mounted, and the same valve can be used as a two-way or three-way valve. Either can be normally closed to inlet pressure, depending on piping arrangement. The valve is built for 150 psi air operation and has ¼-in. ports. Catalog 262 gives data. Hanna Engineering Works.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 277-278. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

77—FORK LIFT for stevedoring operations

Dynamotive Model GLFS is a gas-powered electric-driven industrial truck with lifting capacities to 8000 lb. It has a top speed of 9 mph and a lift speed of 65 fpm, and power to accelerate on a 25 per cent ramp under full load. Lifting eyes are on the counterweight and on the lower part of the

uprights to afford better balance in lowering the truck into the hold of a ship; also they provide a quick means of lifting for service or inspection. Other features announced include a removable screen over the radiator to prevent possible core clogging from lint, dust dirt and foreign particles, and a heavy steel scuff plate extending the length of the truck to protect it from gravel and broken dunnage thrown up by the wheels. The truck is 39½ in. wide, 87¾ in. long without forks. Standard forks are 42 in. long. Outside

WHY IS A MAINTENANCE EXECUTIVE LIKE A GOOD HOUSEKEEPER?

Think about it and you can see they're alike in many respects. While the problems of a maintenance executive are multiplied a thousandfold, he and a good housekeeper have the same objectives – a house in order, a smoothly functioning plant. The unharrassed, relaxed individual above knows that his plant will run like the proverbial clockwork. He's learned the secret of *good plant housekeeping*. But, any maintenance executive can learn it. It's simply an individually planned Remington Rand Maintenance Control System.

That means the functions of construction, repair and *preventive* programs are performed at a realistic operation cost and with maximum equipment productivity. This is achieved by this five point plan:

1. Written Work Orders: detail for maintenance executives all conditions of jobs and work to be performed.

2. Scheduled Work: done in proper sequence with least interference to production.

3. Equipment Records: in one centralized location, list lubrication and inspection intervals, accumulated maintenance history and costs.

4. Stores Control: provides numbering system, eliminates duplication, reduces parts investment, controls obsolescence.

5. Executive Reports: tell management at-a-glance where and when to act.

Call your nearest Remington Rand representative and discover how planned Maintenance Control establishes an effective check over your maintenance programs and provides you with all the facts for making sound decisions. Or send today for booklet X1383, Room 1957, 315 Fourth Ave., New York 10, New York.

Remington Rand
DIVISION OF SPERRY RAND CORPORATION

For more facts circle 657 on Reply Card

Why the LINK-BELT Series 100 is

TODAY'S MOST WIDELY ACCEPTED BELT IDLER

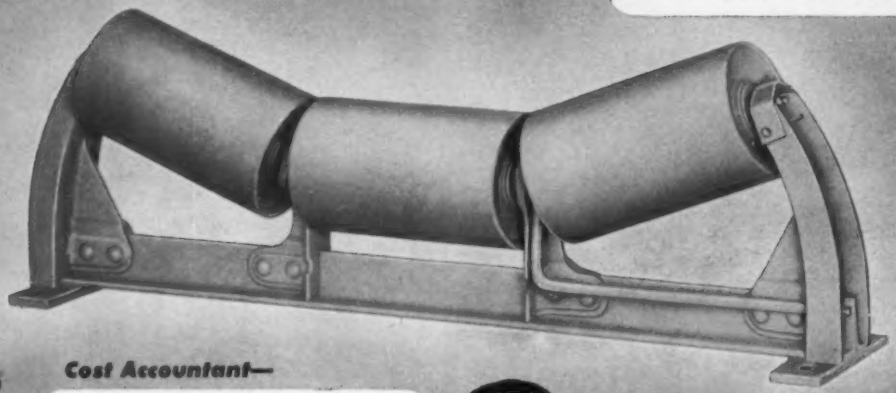
Here's what men who know idlers have to say

Superintendent—

"Service records of the Link-Belt Series 100 belt conveyor idler show that there's no more durable belt conveyor idler in the capacity range. It's a 'work horse'—gives economical service under hard duty, conveying all but the heaviest and coarsest materials."

Engineer—

"Look at these design features. Self-contained, concentric rolls with bearings fully enclosed and protected... strong heavy ribbed brackets and sturdy rigid frames maintain accurate roll alignment—won't spread under load . . . hex nuts that lock rolls in brackets, preventing shaft rotation."



Cost Accountant—

"All costs considered—installation, operation and maintenance. You won't find a better buy in belt conveyor idlers than the Link-Belt Series 100. Its free-rolling action requires less power . . . reduces wear on operating parts and belt . . . cuts replacements."

Maintenance Man—

"Its cartridge seal is the best I've seen . . . has no springs, clips and other small parts to lose . . . cuts servicing time when required. It's tops for keeping grease in, dirt out under the grimiest conditions. Grease fittings are protected, easy to reach."

Broad range of types meets all material and operating requirements

RUGGED . . . free-rolling . . . dirt- and dust-proof—the Link-Belt Series 100 belt conveyor idler combines these and other features for low-cost, dependable materials handling under severe, continuous service conditions. What's more, you have a wide choice of types for any requirement—whether you handle coal, sand, gravel or iron ore . . . sticky or free-flowing materials.

Sturdy rolls of the Series 100 are accurately machined for concentricity—welded for added strength and to keep out dirt and moisture. Smooth, round surfaces and edges prevent belt damage. As for dependability of its roller bearings—Link-Belt has *never* known a bearing failure due to overloading a Series 100 idler. Equally important, strong malleable iron brackets and sturdy, rigid frames maintain accurate roll alignment.

For facts on the Series 100 belt conveyor idler, see your nearby Link-Belt office or authorized stock-carrying distributor. Or write for Book 2416.

LINK-BELT

BELT CONVEYOR IDLERS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,488

For more facts circle 658 on Reply Card

NEW PRODUCTS

(Begins on page 192)

turning radius for the truck is 82 in. Loads may be lifted to heights of between 65 to 250 in., according to mast. Automatic Transportation Co.

78—NON-LIVE HEELS handle light cord, heavy cable

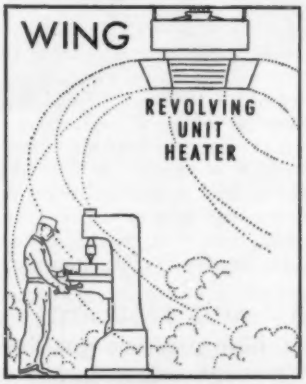
Two portable cable reels featuring wide adaptability have no current collector, sliding brushes or spring contacts, manufacturer announces, and

they handle any size wire or cable. Adjustable steel pins can be inserted to fit desired coil diameter, with the lock-bearing adjustable to any coil width. Loading requires only pulling one end of the cord through an opening in the removable side plate and coiling the cord on inside and outside of the reel, ready for use. Model NL-15 measures 15 in. in diameter, handles 150 ft 12/2 cord; Model NL-18, 18-in. diam, 250 ft, 12/2 cord. Both models are of welded steel construction. Hykon Mfg. Co.

79—DUAL-RANGE METERS give constant flow rate

The 1600 Series Dual-Range Flowmeters are designed for inert-gas welding, flushing molten metals, laboratory service, and other industrial applications where accurate control and constant visual check of flow rate are required. Flow ranges are declared sufficiently wide to meet gas demands formerly requiring more than one metering device. Rapid in-service switching from either flow range to the other is done by means of a piston-type selector valve. Flow rate within either range is controlled by a sensitive needle valve. Accuracy is maintained under all service conditions, company says, and is not affected by back pressures. The series includes seven direct-reading flowmeters, each for a specific gas, and one general-

...Why don't they get WING Revolving Heaters?



Are your workers subjected to steady blasts of heat from suspended unit heaters with fixed discharge outlets? Are some uncomfortably hot while others are just as uncomfortably chilled? Wing Revolving discharge unit heaters are the logical solution to these important personnel problems. The heated air is discharged from slowly revolving outlets and this warm air stream caresses the workers in its circular path for a few seconds at a time, just enough to give a sensation of live, invigorating warmth.

Factories heated by Wing Revolving Heaters are pleasant places to work. Convince yourself—try one.

Write for a copy of Bulletin HR-6A. Use the coupon.

L. J. Wing Mfg. Co.
Division of Aero Supply Mfg. Co. Inc.

Factories: Linden, N. J. & Montreal, Can.
In Europe: WANSON, Haren-Nord, Brussels, Belgium

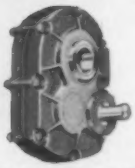
177 Vreeland Mills Road, Linden, N. J.

L. J. Wing Mfg. Co., Linden, N. J. PE-9
Please send me Bulletin HR-6A-Revolving Heaters

Name.....
Firm.....
Address.....
City.....Zone.....State.....

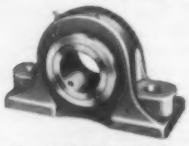
Wing

For more facts circle 659 on Reply Card



TORQUE-ARM
SPEED REDUCERS
Cost less—deliver more!

TAPER-LOCK
SHEAVES
Easy on—easy off! Mount flush!



SC AND SCM
BALL BEARING PILLOW BLOCKS
"The seal won't blow!"

●

Write for Bulletins!

- Torque-Arm Speed Reducers. 15 sizes—1 to 100 hp. Bulletin A-637.
- Taper-Lock Sheaves. Drive tables and technical data. Bulletin A-661.
- Rolling Bearings—SC, SCM and Dodge-Timken. Bulletin A-638.

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 660 on Reply Card

NEW PRODUCTS

(Begins on page 192)

purpose flowmeter, provided with calibration curves, which will meter any of five gases. A combination of two or more flowmeters can be used to proportion a mixture of gases. Flowmeters can be attached to cylinder or pipeline regulators, directly to pipelines, or they can be bench or wall mounted. Air Reduction Soles Co., Div., Air Reduction Co., Inc.

80—WASHFOUNTAIN is strong, easily installed

The redesigned Duo-Washfountain is announced as more attractive, stronger and firmer in construction, and easier to install. There is no scuff base at

bottom so that when the hinged foot-treadle is flipped up, cleaning of the floor underneath is readily accomplished. A touch of the foot controls water served by the sprayhead. The large, two-person bowl is self-flushing, available in stainless steel or pressed steel finished in acid-resisting vitreous enamel—in white or colors. Standard height from floor to rim of bowl is 31 in. Bradley Washfountain Co.

81—VALVE REGULATOR for high pressure gas lines

This pneumatically controlled, cylinder-operated lubricated plug valve device is for high pressure gas regulation with minimum pressure loss. Advantages claimed include operational ease and favorable flow characteristics of plug valve, high capacity with low pressure loss, silent regulation and automatic pressure control. While reported effective on intermediate pressure control, back pressure relief, and widely varying flows, it is primarily designed for high-pressure, large volume applications. The device consists of a cylinder-operated valve with pneumatic controller and valve positioner. An increase or decrease of downstream pressure causes a change in output of pressure controller, which, in turn, causes valve positioner to apply pneumatic power to cylinder operator, thus repositioning valve and controlling downstream pressure at set point. It can be set for either "fail open" (direct acting controller) or "fail closed" (reverse acting) operation. Rockwell Mfg. Co.

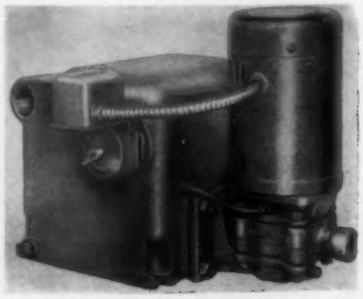
82—PVC TUBING is light, flexible and transparent

Bardex is described as a metal reinforced PVC tubing of exceptional flexibility. Manufacturer reports that it has been flexed to an angle of 90 deg over 1½ million times without cracking or breaking, and that it will bend around a 5/16-in. diam spindle without its internal bore being reduced. It is claimed weatherproof and resistant to acid, gasoline, oils, high octane fuels and sea water. According to manufacturer it will not kink, is self extinguishing and has a working temperature from —5 to 170F, with working pressures from 100 to 200 lb. Electrical conduit is among applications suggested for it and its transparency makes it suitable for sight feed. Six inner diameter sizes range from 1/8 to 1 in. Tensile strength of Bardex is given as 2200 psi; cold break temperature, —50 F. A leaflet and sample of this tubing are offered. Newage Industries, Inc.

83—CONDENSATE UNITS ready to hook to piping

Cond-A-Pacs are packaged condensation return units in simplex and duplex types, ready to hook to piping and line leads. There are four sizes: 500-4000 EDR, unit capacity 8 gpm, simplex with 6-gal receiver, duplex with 12-gal receiver, 1/6 hp; 6000-8000 EDR, unit capacity 15 gpm, 12-gal receiver both simplex and duplex, ¼ hp. Units operate at 3500 rpm.

The pumps are close-coupled end suction centrifugal type with low NPSH characteristics. Impellers are heavy cast bronze. Returns are low—9 in. above floor level. Pump assembly may be removed without disturbing



NO REBORING–

NO KEYSEATING–

NO MACHINING–

NO WAITING!

TAPER-LOCK SPROCKETS
SINGLE AND DOUBLE STRAND!

NOW Taper-Lock *Double* Strand Sprockets are available—from stock—ready for the shaft without re-machining!

They offer all the advantages of Taper-Lock mounting. Easy on! Easy off! Precision machined at the factory, they come to you with accurate, concentric bores —insuring full contact between hub and shaft. Taper-Lock grips with the firmness of a shrunk-on fit!

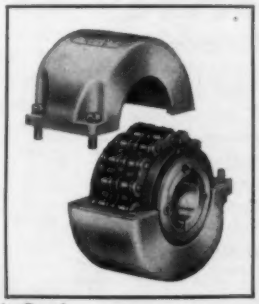
There is no flange, no collar, no protruding part. Flush design means *safety*... If the sprocket becomes worn, you replace only the tooth part. The bushing is used again and again. And Taper-Lock bushings are interchangeable in Dodge Taper-Lock Sheaves, Couplings and Conveyor Pulleys!

Taper-Lock Sprockets and Dodge Roller Chain (made to ASA standards) are stocked by Dodge distributors. Single Strand sizes range from No. 40 to No. 160, up to 112 teeth; Double Strand from No. 40-2 to 80-2, up to 102 teeth. Write for Bulletin A-644 containing selection, installation and maintenance data.

DODGE MANUFACTURING CORPORATION
2700 Union Street, Mishawaka, Indiana

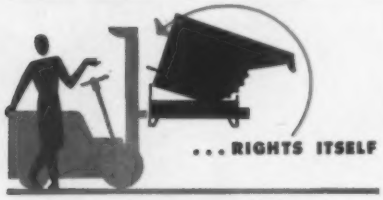
DODGE
of Mishawaka, Ind.

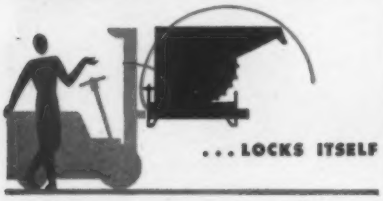
CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new methods. Look for his name under "Power Transmission Machinery" in your classified phone book, or write us.



TAPER-LOCK CHAIN COUPLINGS
Accommodates common minor shaft misalignments. Provides strong, compact coupling. Available with covers, for appearance, safety, dirt protection and lubrication — which increases coupling life.

For more facts circle 661 on Reply Card





...and dares you to damage it.

This is no ordinary hopper. It's a Roura hopper. And Roura makes 'em rugged. It takes on the toughest assignments . . . day in and day out . . . and comes back for more. Even the crash-bang handling of careless lift truck operators doesn't bother a Roura for it's built of extra heavy metal . . . welded with care . . . braced and double-braced . . . for years of trouble-free service.

Your Roura Self-Dumping Hopper will cut hand-unloading costs at least 50% . . . pay for itself before you know it. Available in sizes from ½ to 2 cubic yards for use with fork or platform lift trucks, mounted on live skids or with malleable or rubber tired casters.

ROURA
Self-Dumping
HOPPER

HERE'S HOW to get more details about Roura Self-Dumping Hoppers. Just attach this coupon to your letterhead . . . sign your name . . . and mail to . . .

ROURA IRON WORKS, INC.
1413 Woodland Ave., Detroit 11, Michigan

For more facts circle 662 on Reply Card

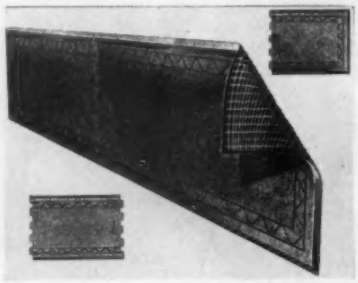
NEW PRODUCTS

(Begins on page 192)

inlet and discharge piping. Motor utilized is said to offer low noise level, high performance characteristics and have overload protection. The units are claimed well suited for air conditioning service. Aurora Pump Div., The New York Air Brake Co.

84—RUBBER RUNNER for "stand-up" comfort

Air-Strip consists of honeycomb rubber runners which interlock to any length. The air cells serve to insulate



against cold and dampness and the cushioning effect reduces fatigue. These runners also reduce noise in heavy traffic and reduce breakage where fragile objects are handled. They come in black and marbelized colors. An oil-and grease-proof rubber is available. R. L. Mitchell Rubber Products, Inc.

85—INDICATION SYSTEM shows level in bins

Activated by a magnetic limit switch, this system is designed to seek and indicate average level of solid contents. It may be coupled with filling or emptying devices, and with stopping or starting of any needed auxiliary control when certain levels are reached. The probe is continuously seeking average bin level at slow speed. When probe is above bin level, the motor drives it down until it hits the material. This releases tension on the spring and the permanent magnet rises to operate the limit switch to reverse the motor and drive probe upward. A slow acting repeater relay of the limit switch contact makes the motor drive the probe up for a short time after the rope tightens. This is to assure that probe will be raised, even if it should be lodged between lumps or buried in the material.

A two-wire circuit provides a remote dial indication reading; or a continuous chart record can be incorporated with suitable auxiliary instrumentation for the purpose. Motor, gear train, wire rope and probe are selected to be suitable for each application, it is noted; a typical bin might require a 6 rpm fph gear motor, a 1/16-in. stainless steel wire rope, and a 2-in. diam. probe. Femco Inc.

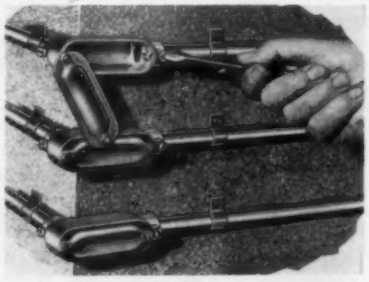
86—PUSHBUTTON SWITCH is space-saving lighted type

The 52PB51-T2 can be mounted on 1-in. centers, both horizontally and vertically, and requires only 2-⅛ in. below its mounting panel. It has snap-action and comparatively high force differential to help prevent accidental actuations. By combining indicator light and switch in one compact assembly, these units cut panel space requirements in half, it is noted. Two subminiature single-pole double-throw basic switching elements offer versatility of circuitry.

In the new switch, the indicator lamp socket is fastened to the outer body of the switch and does not move when the button is pushed. This increases lamp life, according to manufacturer, since the lamp is not subjected to shocks from button actuation. Terminals of the indicator light are separate from those of the switch, allowing indicator light to operate on any circuit desired. The translucent buttons come in many sizes, shapes and colors. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

87—THINWALL FITTINGS come in slip-on design

Speedolets are electrical fittings which can be installed with a screwdriver,



it is announced. To install, you simply slip the fitting over the conduit and tighten the screw—no wrench is required. Made of aluminum alloy, Speedolets will accept manufacturer's Series O device and blank covers. Killark Electric Mfg. Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 277-278.

Packaged Ljungstrom® Preheaters increase efficiency for boilers as small as 25,000 lbs per hour! Money spent on fuel in a single year often equals the cost of the boiler itself! And with fuel prices continually rising, every BTU is doubly precious.

So don't let fuel dollars go up the stack—in smoke. Whether your boiler produces 25,000 or 250,000 pounds of steam per hour, the shop-assembled Ljungstrom preheater recovers heat—and dollars. Results: FUEL CONSUMPTION IS REDUCED! Generally 10% or more. This will usually write off the cost of a Ljungstrom in less than 2 years.

BOILER PRODUCTION IS INCREASED! By preheating air, higher temperatures in the furnace are assured, higher heat absorption and steam producing capacity are made possible.

LESS MAINTENANCE NEEDED! Improved combustion means less slag, cleaner stack gases. Thus you benefit from fewer overhauls; longer service between shutdowns.

LOW GRADE FUELS PRACTICAL! Higher furnace temperatures permit effective burning of very low grade fuels.

COMES READY TO INSTALL! The Ljungstrom is shop-assembled, is easily applied to your steam-generating units. For details, contact The Air Preheater Corporation today. Ask for our free brochure.

The Air Preheater Corporation, 60 EAST 42ND STREET, NEW YORK 17, N. Y.

For more facts circle 663 on Reply Card

STRONG

Extra weight capacity, maximum durability—and a saving of nine pounds per unit—are some of the advantages reported by Heidelberg Brewing Co., Tacoma, Washington, a user of fir plywood pallets since March, 1952. Comparison tests proved that 5,200 plywood pallets put into service have sharply reduced both handling costs and maintenance, and virtually eliminated mortality through actual pallet failure. Repair cost, the company reports, is negligible.

DURABLE

Resin-fiber overlaid fir plywood, used in construction of these electroplating cells, saved more than $30,000 in four years. The fir plywood acid tanks were built for $140 each, a saving of from $400 to $600 under rubber-lined steel tanks. Previous lumber tanks gave trouble with leakage, required heavy framing. Both objections were overcome by the overlaid-plywood units.

VERSATILE

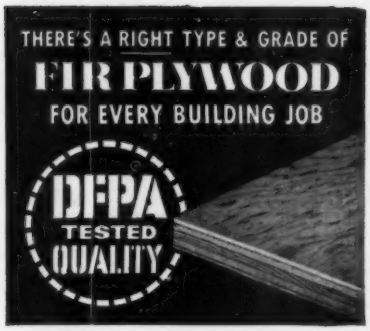
Signs, fixtures, containers, re-usable concrete forms, complete buildings—these are only a few of the applications which use three to four carloads of fir plywood a month at Southern Pacific's huge central mill in West Oakland, California. W. R. Jones, superintendent of the 135-man shop, regards fir plywood as one of their most versatile and indispensable building materials.

DFPA TESTED QUALITY

FIR PLYWOOD

means quality construction

FOR MORE INFORMATION about uses shown above, design and/or specification data, mail coupon ⟶



1. SPECIFY BY DFPA QUALITY TRADEMARKS

DFPA grade-trademarks appear only on plywood manufactured, inspected and scientifically tested under the DFPA quality control program. DFPA, Douglas Fir Plywood Association, is a non-profit industry organization devoted to product research, promotion and quality maintenance.

2. CHOOSE THE RIGHT GRADE FOR EACH JOB

Fir plywood comes in two types: 1. *Exterior* (waterproof glue for permanent exposure to water or weather); 2. *Interior* (moisture-resistant glue) for indoor uses, crating, sheathing, maintenance. Within each type are several grades – i.e., panels with one good side, two good sides. Most popular grades are shown below.

EXT-DFPA

Exterior plywood for permanent outdoor uses

PlyPanel® for paneling, most indoor uses

PlyScord® is unsanded panel for sheathing, crating, bins, etc.

PlyForm® concrete form grades come in Exterior and Interior types.

SPECIALTY PANELS include 1. *Overlaid Exterior plywood* (hard, smooth, abrasion-resistant fused resin-fiber surfaces) for siding, signs, tanks, concrete forms; 2. *Textured panels* with smart grooved, brushed or striated surfaces for fixtures, siding, special decorative effects.

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Wash. (Good USA Only) Dept. 180
☐ Please send basic fir plywood specification data.
☐ Also send information about use of fir plywood for.....
Name.....
Firm.....
Address.....
City..... Zone.... State.....

For more facts circle 664 on Reply Card

New Plant Construction

(Continued from page 158)

pansion program of company facilities for the manufacture of cigarettes in this area. Expansion plans include construction of a new cigarette plant, estimated to cost about $20 million, a new tobacco stemming plant to cost between $8 and $10 million, and new leaf storage facilities to cost another $7.5 million.

Cleveland, O.—Alloy Precision Castings Co., subsidiary of the Mercast Corp., 4471 Hamilton Ave., plans major addition to plant here. Company plans to add about 15,000 sq ft to increase foundry capacity for larger missile components. Work will get under way at once and is scheduled for completion by early 1958.

Cleveland, O.—Republic Steel Corp., 1405 Republic Bldg., has authorized plans for the construction of two new batteries of coke ovens at its Cleveland steel plant. Construction of the new ovens will take about a year and should be completed by late 1958. New $14-million program also includes installation of four new centrifugal, multiple stage gas boosters, to increase gas available for fuel use in the open hearth furnaces. Coke handling facilities will be improved and modern screening equipment installed.

Toledo, O.—Allied Chemical & Dye Corp's Barrett Division, 40 Rector St., New York, N. Y., has announced major plans here. Plant is scheduled for completion in mid-1959 and will be the largest plant in the United States producing thermosetting resins. Reported cost of total expansion is $10 million.

Albany, Ore.—Wah Chang Corp., 233 Broadway, New York 7, N. Y., plans major expansion at company's metallurgical operations here, which will cost $1 million. A new zirconium purification unit is planned. New facility will be located northwest of the zirconium reduction plant recently activated.

Simpsonville, S. C.—W. R. Grace & Co., 7 Hanover Square, New York, N. Y., has announced plans for the construction of a major addition to Cryovac Division's plant here for the manufacture of vinylidine chloride film. New addition to more than double present bag capacity will cost approximately $1 million when completed in 1958.

Mt. Pleasant, Tenn.—Victor Chemical Works, 155 N. Wacker Drive, Chicago 6, Ill., plans to construct a multimillion dollar organic chemicals plant here. Engineering plans are nearing completion and construction work will start soon. New plant will augment company's organic chemical production capacity at Chicago Heights, Ill., and Nashville, Tenn.

Beaumont, Texas—Borden Co., 350 Madison Ave., New York, N. Y., has announced that work is already under way on the construction of a new milk processing plant here. Project will represent an investment of $1 million.

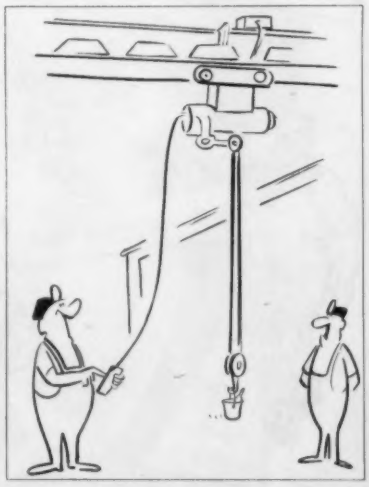
San Antonio, Texas—Rath Packing Co., Waterloo, Iowa, plans to construct a new meat packing plant in the Bexar County Coliseum industrial area here. Plant, with an area of 50,000 sq ft, will be used for the manufacture of a full line of sausage products and sliced bacon and as a distribution center for company's products in the Texas and Southwest area. Plant is now under construction and will be in production by late 1958 at a reported cost in excess of $500,000.

Texas City, Texas—Monsanto Chemical Co., 1700 S. Second St., St. Louis, Mo., plans major expansion of company facilities for the production of integrated petrochemicals. A 40 million-lb increase in the rated capacity of the styrene monomer plant is planned for completion in June of 1958 and 12 million-lb addition to the plant's acetylene capacity will be completed by early 1958.

Salt Lake City, Utah—Sperry Utah Engineering Laboratory, a division of Sperry Rand Corp., 30 Rockefeller Plaza, New York, N. Y., has construction under way on a 100,000-sq ft addition to company's guided missile plant here, near city's municipal airport. New construction will bring company's investment to more than $1.5 million.

Winfield, W. Va.—Union Carbide Corp., 30 E. 42nd St., New York, N. Y., plans to construct a major chemicals plant on large plant site on the south bank of the Kanawha River, near here, the county seat of Putnam County. New plant is scheduled for completion by mid-1960 and was necessitated by the continuing growth of company's petro-chemicals business.

(Continued on page 270)



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Triangle Type RR Cable is rubber insulated and neoprene jacketed. Three top-grade rubber insulations are available to match the service requirements. The jacket is Triangle's Trioprene, a neoprene compound developed especially for its toughness and resilience, its good aging and heat resisting properties, plus its ability to withstand severe weather conditions, oil, grease, and most chemicals.

Flexible, light weight and tough, it is easier to handle, splice, or terminate than metallic sheathed cable, has lower first cost. And, its suitability for overhead, or underground, or duct installations makes it unnecessary to carry more than this one type in inventory. Approved for Airport Lighting Cable Type A (CAA L-824) and for Underground Service Entrance, Underwriters' Laboratories Type USE.

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NEW BOOKS

for the plant engineer

Maintenance Engineering

HANDBOOK edited by L. C. Morrow. MAINTENANCE ENGINEERING Size 9¼ by 6¼ in.; 1528 pp; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y. Price $20.00..

VARIOUS PHASES of maintenance engineering are covered in this handbook which contains material from 75 contributors. The book includes fundamentals and procedures essential in keeping production moving.

There are sixteen principal divisions in this publication. Some of the section topics are as follows: maintenance personnel administration, lubricants and lubrication, welding, corrosion, and project control.

Among the many subjects specifically treated in this handbook are the following: incentive payment of maintenance workers, using tabulating machine cards, setting up budgets for maintenance, maintenance of roofs, cutting down electric power bills, illumination, chain hoists, reciprocating air compressors, and dust collecting equipment.

Publishing History

THE FIRST ONE HUNDRED AND FIFTY YEARS. Size 10¼ by 7¾ in.; 242 pp including index; illustrated; cloth bound. Published by John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $7.50.

THIS HISTORIC REPORT pertains to the publishing firm of John Wiley and Sons, Incorporated. The work does not cover all the books that were published under the Wiley name over the span of 150 years. A number of books is mentioned in each category of interest. The parts various books played in weaving the historical background of the present organization are discussed also.

The book begins with a brief account of New York in 1807, the year Charles Wiley, the founder, opened a print shop and book store in that city. It continues with a section on Wiley's literary books and some information on Wiley's association with G. P. Putnam. This is followed by material on books cover-

For more facts circle 665 on Reply Card

ing such fields as civil, mechanical, and electrical engineering; geography; statistics; aeronautics; physics and architecture.

Hardware

HARDWARE AGE BUILDERS' HARDWARE HANDBOOK. Size 11¼ by 8¾ in.; over 225 pp; illustrated; cloth bound. Published by Chilton Company, 56th & Chestnut St., Philadelphia 39, Pa. Price $8.00.

IN PLANT ENGINEERING work, there are repairs and parts replacements involving hardware. There may be a need for descriptive information for this reason. This book should be useful not only for item identification, or requisitions for example, but also for planning and getting ideas on hardware.

There are two chapters on butts and hinges; one pertains to a standard and the other to a special classification. An additional chapter presents material on jamb, floor and checking floor hinges.

The lock section of the book includes many illustrations showing partial edge views of doors and the way various locks appear after installation. Comments are keyed with lock end views.

Some of the other topics treated in the book are as follows: door closers, transom, sliding door and lavatory hardware, lock security and keying. In the back of the book there is a glossary of hardware items and terms.

Rigging Tips and Data

HANDBOOK OF RIGGING by W. E. Rossnagel. Size 9¼ by 6¼ in.; 321 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N.Y. Price $6.50.

THIS REVISED SECOND EDITION of the handbook on rigging begins with a chapter on fundamentals and continues with a discussion on fiber rope. A feature of the section on fiber ropes is a collection of illustrations showing various ways of tying rope. A following chapter on wire rope takes into account construction of wire rope, storage, lubrication, attachments, inspection, factors of safety and other facets.

Some of the other chapters in the book cover hoisting chains and hooks, slings, wood for structural purposes, scaffold planks, cranes,

(Continued on page 266)

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It's smart today to buy all your electrical needs — switches, fittings, wire, conduit, cable — from your nearby distributor. One call shopping saves you time and money.

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NEW BOOKS

hoists, derricks, and strength calculations for metal beams.

Methods for Product Control

QUALITY CONTROL AND STATISTICAL METHODS by E. M. Schrock. Size 9¼ by 6⅛ in.; 246 pp including index; illustrated; cloth bound. Published by Reinhold Publishing Corp., New York 22, N.Y. Price $6.75.

THE SECOND EDITION is an improved and updated version of the book whose first edition was published about seven years ago. This edition now takes into account the development of the quality control field, and the statistical and administrative problems connected with the organization of quality control program.

Also included in the book is new material on rapid approximate tests of significance, and analysis variance. In addition there are study aids in the form of practice problems at the ends of most chapters.

Some of the chapters covered in this book are as follows: the quality control chart for variables; modified control chart limits; quality control by limit gaging; acceptance sampling; sequential analysis; and the meaning of numbers.

Handy Guide

HEATING VENTILATING and AIR CONDITIONING GUIDE (1957). Size 9¼ by 6½ in.; 35th edition; over 1250 pp; illustrated; cloth bound. Published by the American Society of Heating and Air-Conditioning Engineers, 62 Worth St., New York 13, N.Y. Price $12.00.

THE LATEST edition of the guide carries a great deal of information. It contains numerous tables, many are new. Material has been revised and rewritten. A chapter covering environment and exposure of workers has been added as well as 115 new illustrations.

Subject matter is divided into seven sections; these are: fundamentals; human reactions; heating and cooling loads; combustion and consumption of fuels; systems and equipment; special systems; instruments and codes.

As in previous editions, in the back of the book there is a catalog section showing various products and giving corresponding names of manufacturers. A large, detached and folded psychrometric chart also comes with the book.

Industrial Plant Processes

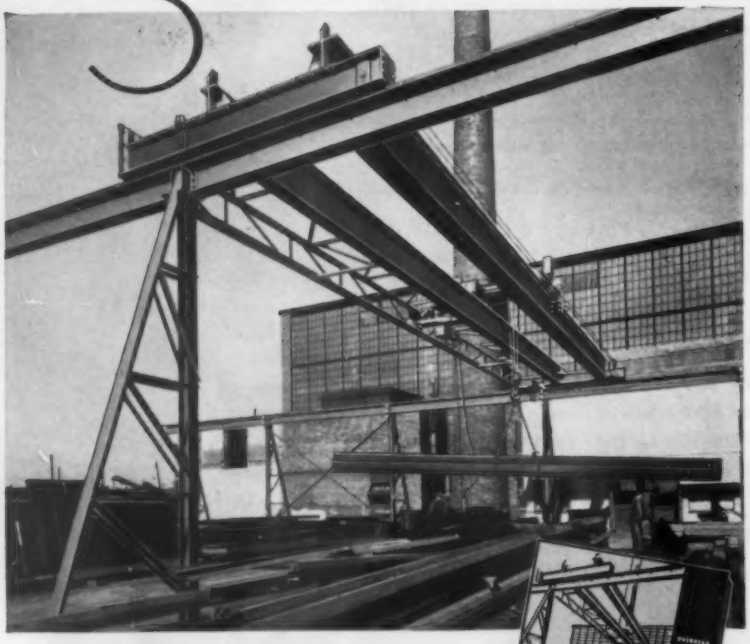
MANUFACTURING PROCESSES by Myron L. Begeman. Size 9¼ by 6⅛ in.; 4th edition; 612 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y. Price $8.00.

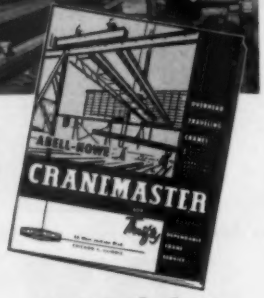
CHAPTERS IN THIS FOURTH EDITION have been rewritten. There is greater stress in this book on principals and materials. New topics discussed include electroforming, metal coating processes, electrospark machining, ultrasonic machining, chem-milling, and automation.

Among the 166 new illustrations there are 89 line diagrams. Photograph illustrations have been revised to show modern equipment.

Special casting methods, powder metallurgy, cold working of metal, press work, heat treatment of steel, welding, and metal sawing are some of the topics treated in this book.

3 reasons why...





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- *You save on engineering cost* because there's a *standardized* CRANEMASTER for virtually every building condition.
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Describes in detail the many design and operating advantages of CRANEMASTER overhead traveling Cranes. Also explains how Abell-Howe provides competent service from original survey to final installation.

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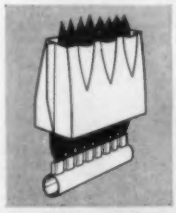
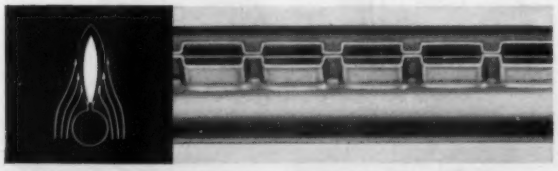
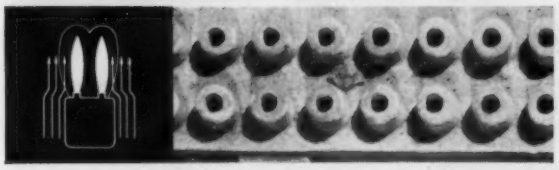
Magnificent MODINE

gas unit heater



FAST, UNIFORM HEAT. Continuous, even flame from front to rear of individually and directly fired tubes boosts radiant heat absorption and uniform heat distribution.





SELF-CLEANING PORTS. Knife-sharp Modine stainless steel ports (top) have four times the free area of drilled ports (bottom). Keen edges resist lodging of dirt and scale . . . permit clean, steady burning. Single-row arrangement assures efficient combustion.

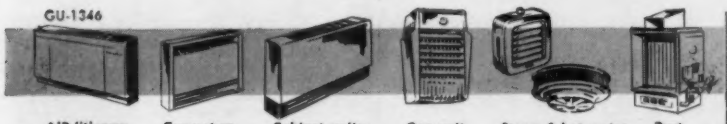
Years ahead in styling
Years ahead in performance

The superb beauty and dependable comfort offered by the Modine gas-fired unit heater are unmatched. Its distinctive modern lines are enhanced by the perfect blending of sparkling chrome and a restful gray-green finish. And it's a great performer too . . . gives you quick heat, long-lasting service.

Advanced-design features include quiet, low-speed motors . . . corrosion-resistant stainless steel burners and stainless or aluminized steel heat exchangers. And because Modines are up to 50% lighter, they cost less to ship and install. Eight AGA-approved sizes are available from 25,000 to 310,000 Btu, the largest size often replacing two smaller models with attendant savings.

***For details,** call the Modine representative listed in your classified phone book or write Modine Mfg. Co., **1563** DeKoven Ave., Racine, Wisconsin. Ask for Bulletin 656-A.*

GU-1346



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Modine
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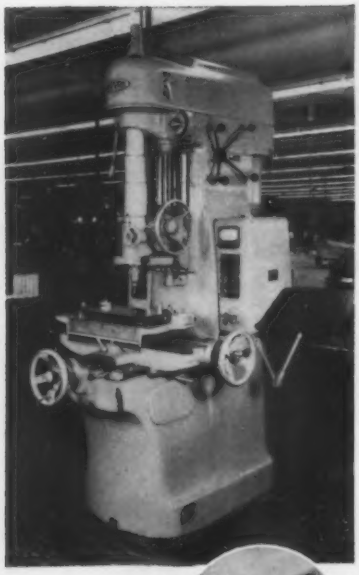

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Only VINYL Air-Loc® 4·17·4 machine mounts give you all these advantages

- *Complete resistance* to oil, water, etc.
- *Precision shimming* is easy.
- *Reduced* machine vibration & noise — as much as 85%.
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Return coupon for samples and booklet about AIR-LOC. No obligation.

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Fluid Power Maintenance

(Continued from page 148)

from damage. Pistons for hydraulic cylinders, especially if they are of the automotive type, should be stocked in the oversize state so that they can be ground to fit the cylinder tube. Automotive type piston rings for hydraulic cylinders should be stocked in sizes 0.010 and 0.025 over the nominal bore size. They should be well preserved so as to eliminate any rusting conditions.

It is rather difficult to know what to stock in the way of hydraulic cylinder tubes unless one has quite a number of cylinders of the same bore and stroke in his plant. In this case, it is suggested that a complete spare cylinder be kept on hand at all times and if failure should occur, send the defective cylinder back to the supplier for a complete overhaul as he is equipped to rehone the tube if necessary and make other major repairs. He is also well equipped to pressure test and check for internal leakage.

In storing a complete cylinder, protect it from damage. Keep the piston so that it is in the retracted condition. This not only conserves space, but will also require less preservative for the piston rod. All machined pads on the cylinder should be coated with a preservative. Pipe ports should be plugged with desiccator type plugs. Before plugging, it is well to fill the cylinder with a good grade of hydraulic oil. If the piston rod has a threaded end, be sure to protect the threads.

Solenoids or solenoid coils often fail on air and hydraulic valves. Keep a supply on hand in the voltages that are required in your installations. In storing them, keep each size and voltage together so that there is no possibility of getting the wrong solenoid on the job. Solenoids should be kept in their original containers and should be stored so as to prevent damage to plungers, mounting feet and coils.

It is well to keep a few spare pumps on hand, at least a spare for each pump that is on a vital operation. Due to the tremendous volume of pump sales, it is often impossible to secure a new pump at a moment's notice. Many pumps are not easily repaired and should be sent back to the supplier for a complete overhaul when failure occurs. This takes time, so a spare pump for the vital operations is a good investment. Pumps should be stored the same as other pieces of precision equipment, protect it internally and externally from condensation and foreign matter.

Where you are using a considerable amount of air or hydraulic equipment

DON'T GIVE UP!

—ON THAT TOUGH METAL-CUTTING PROBLEM!

USE HKP® PORTER CUTTERS

JUST CAN'T BE BEATEN . . .

If it's a "hard-to-figure-how", metal-cutting job, — there is a PORTER CUTTER that can handle it for you, with amazing speed, and lowest possible cost. In the versatile PORTER line there are 108 different hand-powered cutters, each one designed to do a particular job, or jobs — to cut some type or size or shape of metal fast and cheap, including BOLTS, RODS, SCREWS, RIVETS, WIRE, CHAIN, SOFT, MEDIUM AND HARD METALS, STEEL STRAPPING, and many others. These rugged cutters exert up to 20,000 pounds cutting pressure — make hard work easy, cut labor costs as much as 97%! Want profitable proof? Write for the PORTER catalog.

Illustrated above — is the famous PORTER CENTER-CUT CUTTER. The leading all-round cutter for industrial production. 8 sizes — up to ¾" capacity.

for "PRODUCTION" CUTTING

The PORTER WORK-STATION CUTTER — in 3 sizes — can increase the output of one man up to 300% in continuous volume cutting, up to ½" capacity.

for THOSE RUGGED JOBS!

PORTER HEAVY DUTY CUTTER

Cuts almost anything in metal — up to ¾" diameter — thanks to its heat-treated, heavy-forged straps, and hard-tempered, center-cut jaws. Available in 3 sizes.

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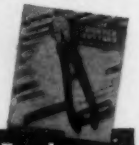

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True economy lies in buying that which serves you best at reasonable prices. Low first cost is false economy if it means frequent replacements.

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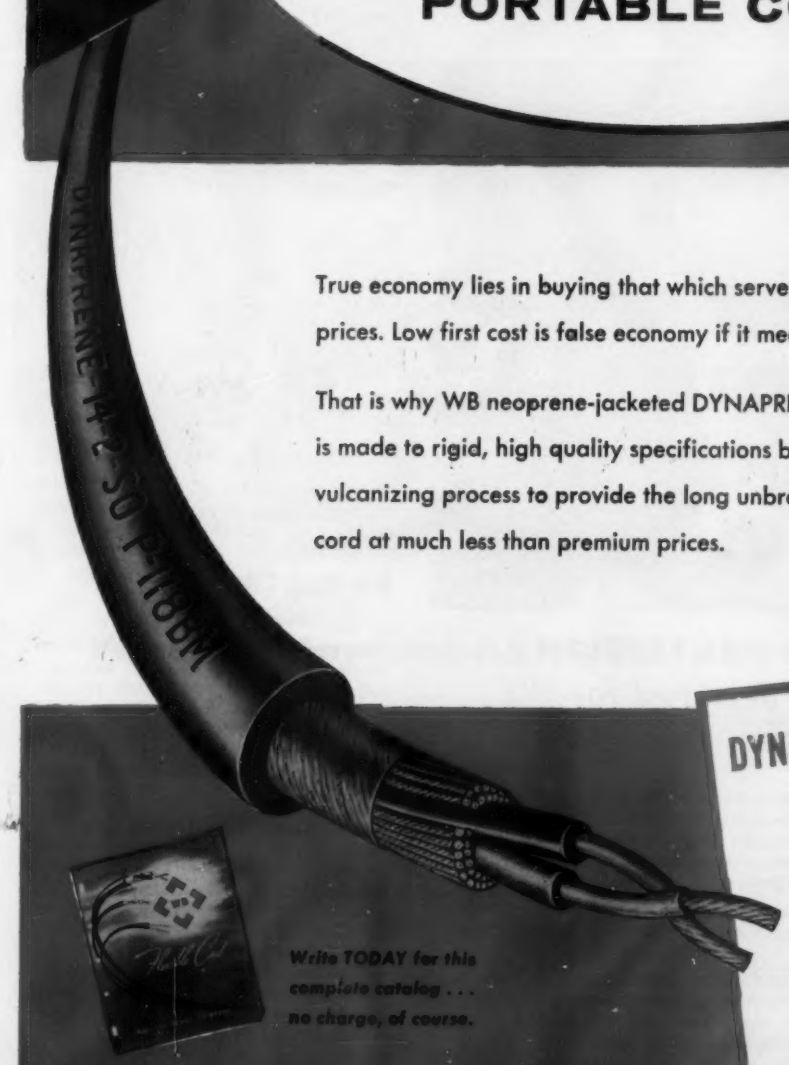

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HIGH FLEXIBILITY
LONG FLEX LIFE
STRONG—TOUGH
STANDS UP UNDER SHOP CONDITIONS
FLAME RESISTANCE

Well Built Wires Since 1899

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WHITNEY BLAKE COMPANY
NEW HAVEN 14, CONNECTICUT

For more facts circle 671 on Reply Card

Fluid Power Maintenance

(Continued from page 268)

in your plant, it is well to carry a small stock of filters, filter elements, pressure gages and flow control valves. These do not cost too much and they can save you considerable time. Store them as you would your other fluid power spare parts.

While hydraulic oil is not actually a spare part in the real sense of the word, a quantity should be on hand especially if the one you use is not handled by a local supplier. The hydraulic oil should be kept in clean containers away from the weather. The hydraulic oil should not be mixed with other oils.

A good job of housekeeping in your fluid power repair parts store room will be rewarding.

Now, in finishing up this series on fluid power maintenance, let's review some of the points we have covered. Remember these and put them in practice and you will reap many benefits from your fluid power equipment.

1. Dirt is the main cause of failure to components of fluid power systems. Take proper precautions to keep it out of the system.

2. Heat is a damaging factor to a fluid power system. Eliminate "hot spots," both internally and externally. Use high temperature seals where necessary.

3. When making an installation, mount all components solidly, and on a smooth surface. Cylinders can impart a considerable amount of thrust and should be anchored accordingly.

4. For an hydraulic system select a good grade of hydraulic oil and properly maintain it. In a pneumatic system make certain that sufficient lubrication is always present.

5. A preventive maintenance program will pay you big dividends. It will give you much satisfaction with your fluid power systems. END

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An effective installation that operates at the lowest cost per year requires experienced engineering evaluation of site and environmental conditions. The Electro Rust-Proofing Engineering Division makes available to you the cumulative experience gained in designing more than 10,000 cathodic protection systems.

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"I had a long talk with an illuminating engineer last night."

New Plant Construction

(Continued from page 263)

Vancouver, Wash.—Edna Bay Pure Stone Co., Dallas, Texas, has announced selection of a plant site on the Columbia River, near here on which it plans to build a new plant for the production of limestone. Construction of the plant will start at once and will cost approximately $5 million.

La Crosse, Wis.—Trane Co., 206 Cameron Ave., plans expansion of company's laboratory facilities here. Construction program is already under way to double research capacity of the plant by January 1958. New addition of 30,000 sq ft will be used for testing fans, heating and air conditioning equipment and a 5000-sq ft area will be devoted to the study of heat exchange and heat dissipation problems involved in guided missiles, jet aircraft and atomic energy development. Cost will be about $700,000.

Washington, D. C.—Embassy Dairy Co., 1620 First St., N. W., plans a large dairy addition, along with certain alterations for the processing of dairy products. Addition when completed will cost in excess of $500,000. George Stone, Wire Building, Washington, D. C., is the architect.

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Day-Brite CFI-10 fixtures bring *lifetime* visual comfort to working areas in North Wales (Pa.) plant of Precision Tube Company, Inc.

You pay for useful eyes...protect them!

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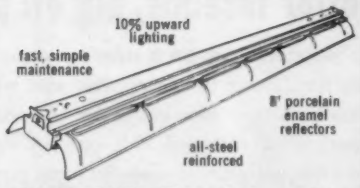

THE DAY-BRITE CFI-10—Engineered to deliver a lifetime of service. Rapid-start, slimline, and high-output rapid-start lamps. Available in 2 or 3 lamp units. Sliding clamp hangers can be positioned anywhere on the run. Hot-bonded, rust-inhibited enamel finish.
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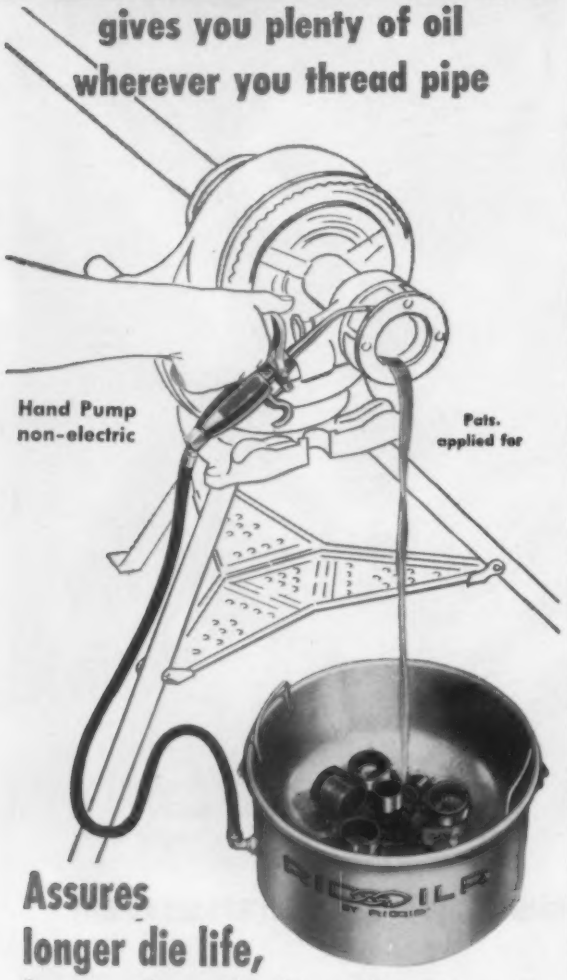

Assures longer die life, better threads, big oil savings!

No wonder **RIDG-OILR** sales have soared . . . it lets you flood your threading dies cool wherever your work is, makes them cut better threads, last longer. Consists of screened chip-pan in circulating oil reservoir with hose-connected hand pump-gun, easy to operate—light to carry. Oil is double strained, used over and over. No messy floors. Quickly pays for itself—buy it at your Supply House!

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RIDGID
Work-Saver Pipe Tools

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Heat Pump Economics

(Continued from page 131)

ing, 141 kw would have produced 384,000 kwh or a usage factor of 31 per cent. Corresponding figures for a 2000-kw demand installation in the Chicago area showed a usage factor increase from approximately 40 to 42 per cent.

Heat pumps alone will not overcome the imbalance indicated, but do represent a major step in the right direction. From the utility's viewpoint the annual load factor will usually be improved and will make attractive power rates possible. This, in turn, improves the operating cost comparison of the heat pump with mechanical cooling plus fossil fuel-fired heating boilers in many regions. END

Airless Hot Spray Painter

(Continued from page 103)

ed at low points in the various lines to permit cleaning.

The three-channel paint gun hose is a continuously extruded design. The water channels in the hose are used "as is", but the paint channel is provided with a wire braid-covered Teflon hose insert for additional strength and resistance to abrasion. The unit will operate one large paint gun depositing approximately 0.3 gal of paint per minute at the end of a 150 ft three-channel hose extension.

The mill white paint most commonly used is a very fast drying variety. A minimum of thinner is required as the 170-deg temperature of the paint reduces its viscosity to good spraying consistency. Thus very little air contamination and odor occurs while spraying. Mechanical atomization results in a dense, close-patterned spray as the spray pattern is not affected by the expanding volume of compressed air that emerges from the nozzle orifice of the conventional spray gun.

Quick-drying properties of the mill white paint, plus the fact that it contains a minimum of thinner to be evaporated, permits the atomized paint to become thoroughly dry while it is still airborne if it misses the spray target. Thus any overspray, or bounced spray, turns into paint dust particles before it can contact and color nearby objects. These paint dust particles settle rapidly and over a small area as there is no compressed air stream behind them to scatter them widely. If no machinery is present, they can be allowed to settle directly onto the floor where they may be swept up with a broom. A simple drop cloth to intercept the settling dust is all the protection required for either people or machinery beneath the area being sprayed.

Before development of this portable airless hot spray painting unit, entire sections of the building had to be sealed off and protected with drop cloths before painting. Now work can go on as usual in a shop department while the ceiling structure is being painted. END

Adapting Old Buildings

(Continued from page 136)

level to adjust dock height to carrier-bed level. Sometimes the use of large planking under the rear wheels of road trucks will equalize the truck bed with the dock level.

9. Modernizing loading platforms and shipping docks

In addition to their height, loading platforms and shipping docks in existing buildings are frequently too narrow or too weak in construction to withstand powered truck traffic. When industrial trucks are used on them, these docks should be sufficiently wide at all points to permit a fork truck to turn around and reverse its direction.

Furthermore, there should also be room along one side of the dock for depositing a row of pallet loads waiting to be shipped out or taken into storage.

The platform edges of truck docks should be protected from chipping caused by truck wheels and forks. Wooden platforms should be checked periodically for loose planking, weakened supports, and rotting. Dock activity sometimes warrants building the dock with a slight slope so that highway truck drivers can back up their trucks where the dock height is the same as that of the truck-bed level.

When fork trucks are used for unloading and loading common carriers, it is often practical to dispense entirely with the need of elevated platforms at carrier-bed level. These trucks can serve as both a transportation vehicle and a lifting device. They will also permit loading and unloading operations to take place on carriers located at a distance from the plant or warehouse building.

10. Permanent ramps and tractive effort on inclines

The tractive effort exerted on runway surfaces of traffic aisles and ramps, such as illustrated in Fig. 8, is influenced by three resistance factors. Tractive effort may be defined as the motive force exerted at the driving wheels of a truck or tractor in overcoming resistance to motion.

The three resistance factors consist of:

1. Surface resistance: rolling-friction resistance per ton of gross weight being moved.
2. Grade resistance: gravity resistance of 20 lb per 1 per cent of grade for each ton of gross weight being moved.
3. Acceleration resistance: inertia which must be overcome during starts.

Table I shows these three resistance factors per ton of gross weight for various types of surface coatings, and for various slopes as well as for three different normal rates of acceleration. It will be noted that each per cent of up-grade requires 20 lb of additional tractive effort per ton of gross weight being moved. To haul a load up a ten per cent grade requires 200 lb per ton more power than the power used on a level floor.

Based on the resistance factors specified in Table I the formula for tractive effort may be illustrated, as in Table II, for a trailer with weight of 10 tons moving up a poor concrete ramp with a 5 per cent grade, and accelerating at the rate of 35 fpm per second:

11. Yard ramps and portable docks in plant yards

In plant yards, warehouse yards and storage areas where dock facilities are not available, portable ramps may be used for loading and unloading freight cars. These ramps may be obtained in sections that can easily be positioned by fork trucks in front of freight-car doors. One end of the ramp rests on the ground and the other is lifted and placed on the car floor, or on the portable platform in front of the car.

Being about 30 ft in length, as a rule, these ramps provide a 12 per cent grade to permit fork trucks or trailer trains to travel up and down without difficulty. The use of these portable yard ramps enables a plant or warehouse to load and unload palletized loads of material in and out of boxcars and reefers located at a distance from the building. END

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Activities of AIPE

(Continued from page 137)

the years for the advancement of the profession of plant engineering.

"We acknowledge with gratitude the notable contributions produced through your vision and your devotion to our profession.

"That this has brought you into international prominence is to be expected and it is beyond us to add to those honors.

"However, with a deep sense of appreciation, we give you this token, hoping that it will be an occasional reminder of those friends you have made along the way."

New York

New officers for the year:

E. C. Bannan, Wright Aeronautical Division of Curtiss-Wright Corp., president; J. C. McClymont, Pioneer Ice Cream Div. of Borden Company, secretary-treasurer. H. F. Harman, E. I. du Pont de Nemours & Co., Inc., outgoing president, will be the National Delegate.

Outgoing President Harman and Past Presidents E. Hess, Curtiss-Wright Corp., F. McDermott, Lever Brothers Co., and H. Travis, Ruppert Brewery, were presented with gavels in appreciation of their past services to the New York Chapter.

Greater Kansas City

New officers for the Greater Kansas City Chapter will be:

Paul J. Anderson, Colgate-Palmolive Co., president; H. R. Lamborn, Phillips Petroleum Co., vice president; R. E. Bent, The Darby Corp., secretary; and R. E. Bates, Proctor & Gamble, treasurer.

San Francisco

New officers for the San Francisco Chapter will be:

K. Leonard, Kaiser Aircraft & Electronics Co., president; K. W. Buckley, San Francisco Naval Shipyard, vice president; R. L. Pleski, Pacific Electric Motor Co., secretary; and R. H. Morey, Pacific Paint & Varnish Co., treasurer.

Piedmont

New officers for the Piedmont Chapter for the coming year will be:

S. L. Carter, P. H. Hanes Knitting Co., president; W. J. O'Melia, Western Electric Co., vice president; C. R. Biggs, Container Corporation of America, secretary; and W. H. Duttweiler, Western Electric Co., treasurer. END

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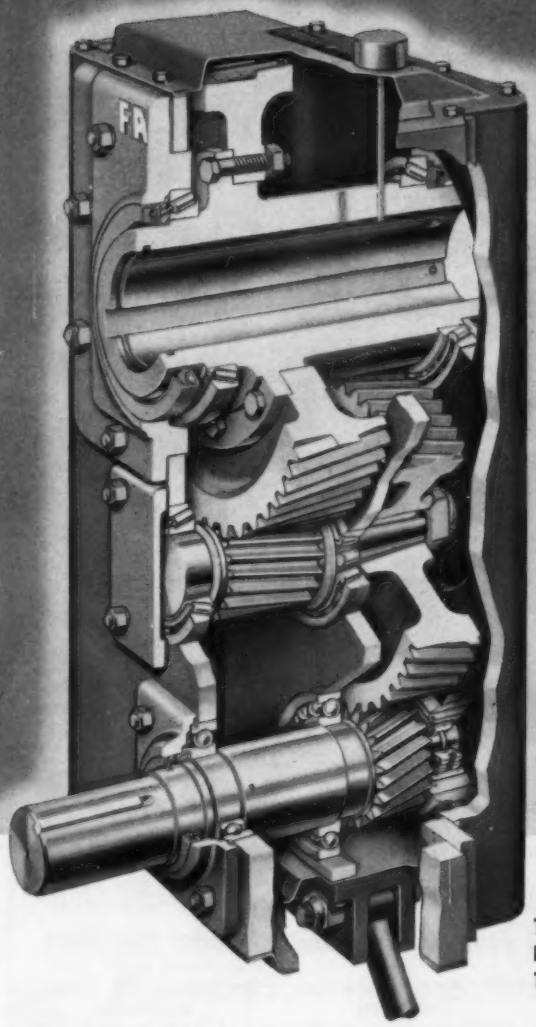

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FROM 2 HP AT 5 RPM
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New — 3-wall, one-piece housing provides double the ability of cast iron to withstand external impact or shock loads.

New — ratio range—5:1, 14:1 or 25:1. Higher ratio range makes possible lower output speeds...smaller sheaves...standard, rather than slow-speed, motor.

New — ease of maintenance. All revolving elements can be easily replaced in the field, on the jobsite! Inspection covers permit quick inspection of gears and bearings. Dipstick provides quick check on lubricant.

New — longer center distance between shafts allows use of larger sheave on input shaft. Unit may be mounted with input shaft next to driven machine, and with motor mounted directly under driven shaft.

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- Tie rod fastened to steel housing by steel bracket with bolt in double shear. Shock load on tie rod will not damage housing.

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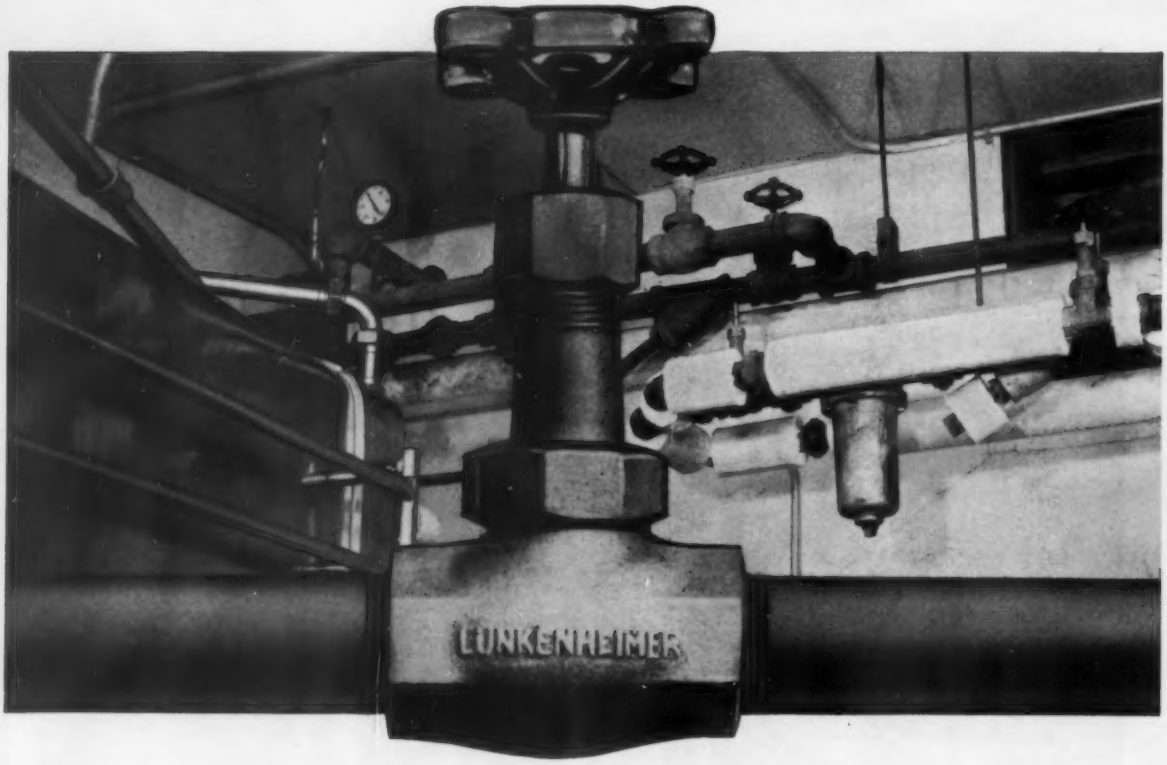

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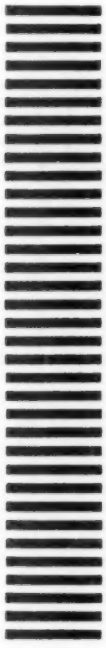

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BULLETINS

(Begins on page 21)

STORAGE

147 Steel Cabinets — Bulletin SE-6 describes and illustrates steel cabinets, wardrobe cabinets, desk-height cabinets, combination cabinets, tool cabinets, others. Design and construction features of the line — including three-point security latching, adjustable shevles — are presented. Also illustrated are steel lockers and shelving. Penco Metal Products Div., Alan Wood Steel Co.

148 Steel Shelving — Hallowell Erectomatic steel shelving with built-in shelf-locking device is covered in Form 2279. Details the locking action in photos and shows other time-saving construction features. Number of models available in each type, and size included. Standard Pressed Steel Co.

149 Towards Neater Stockrooms — Prevention of accidents through good housekeeping, orderliness and neatness in stockrooms is stressed in three large posters offered by the company. How steel shelving encourages neat stocking is the theme of the posters. Deluxe Metal Furniture Co.

MATERIALS HANDLING

151 Crane Selection Simplified — Bulletin 15005-1-57 is a 20-pp booklet on company's Load Lifter cranes with capacities through 20 tons, spans through 80 ft. Cataloging the 16 cranes in the line is such as to facilitate determining exact crane to meet job requirements and get information needed to evaluate features and design advantages. Includes explanation of basic factors to be considered in buying cranes, specifications of models covered. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

152 Outdoor Fork Lifts — This 8-pp catalog describes construction, operating characteristics and specifications of company's Ranger line of fork trucks for outdoor handling. All three models —15,000-, 20,000- and 30,000-lb capacity — are treated. Schematic drawings show torque converter, power-shift transmission. Clark Equipment Co.

153 One Man Handling System — This 8-pp bulletin describes a "one man crew" materials handling system. Tells how it can be utilized, and its advantages. While developed for use on freight terminals, this system may be adapted to general receiving and shipping operations. In it, each employee works alone, serving as stripper, checker and loader. Basic ingredients are electric fork lifts and storage racks. Lewis-Shepard Products, Inc.

154 Industrial Tires — This 36-pp illustrated guide book covers all phases of industrial tire use. In addition to specifications, book covers company's entire line, use of each type of industrial tire, variations in pneumatic tire capacities at various speeds, wheel and caster combinations available, latest available truck manufacturers' tire specifications. B. F. Goodrich Tire Co.

155 Pneumatic Handling—This 8-pp bulletin presents the Flo-veyor system for handling chemical, sand and other dry granular materials through a pipe line. Stresses versatility of the system and illustrates both a manually-controlled and an automatically controlled operation. System components are described. The Brady Conveyors Corp.

156 On Hinged-Steel Belting — Six pp Bulletin MF-600, describes hinged-steel belting, perforated steel belting, shown, and diagrams and charted specifications provide dimensions. Plain steel belting, perforated steel belting, dimpled steel belting, multi-winged steel belting and cleated steel belting are shown. Recommended applications are covered. Also included are simplified assembly instructions for interchangeable components. May-Fran Engineering, Inc.

157 Wire Rope Operations—Various uses of wire rope and wire rope slings for a number of handling operations are described in Rope-Ology 5781. Applications are illustrated with photos. Macwhyte Co.

158 On Chain Block Safety — This wall chart illustrates safe handling of chain blocks. Sketches cover nine principles of handling, showing what should always be done and what should never be done. Reverse side of the chart gives data on company's line of chain blocks and trolleys. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

159 Hydraulic Elevator — Bulletin 558, 6 pp, covers foot-operated and battery-operated hydraulic elevators with 750-lb standard capacity, 71-in. lift, and 83-in. height for convenient passage through 7-ft doors. Complete specifications on the portable elevators are provided. Barrett-Cravens Co.

LIGHTING

160 Fluorescent Ballasts — Publication GEC-983K is a 16-pp selection guide covering company's line of fluorescent lamp ballasts. Contains a list of obsolete ballasts and suggested replacements for them. Also gives prices, data on ballast lead lengths, cross section dimensions, table on lead stripping and tinning, wiring diagrams, and electrical specifications. General Electric Co.

161 Selecting Floodlights — Bulletin GEA 6175A, 16 pp, discusses essential features of floodlighting installations, and provides glossary of terms and classification and application guide. Discusses general principles of floodlighting, explains floodlighting calculations, and provides tables of recommended footcandle levels for various types of installations, lists photometric data. General Electric Co.

DUST, FUME CONTROL

162 For Air Cleaning — Company's new Precipitron models PA and PF air cleaning equipment are discussed in 8-pp Bulletin B-1460. Contains pictures, descriptive text and capacity-dimension charts. Advantages and construction discussed. Sturtevant Div., Westinghouse Electric Corp.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on the facing page.

163 Thermoplastic Exhaust—A summary of components necessary to design, fabricate and install a corrosion-proof industrial exhaust system from polyethylene is presented in this 12-pp bulletin, Volume 111. Describes centrifugal fans, ducting and fittings and hoods, and includes photos, drawings, dimensions. American Agile Corp.

164 For Dust Control — Sixteen-pp Bulletin 274B describes company's Type W Roto-Clone, a dynamic precipitator. Discusses its operation, covering various arrangements. Explains units distinguishing feature — addition of a water spray to basic principle of dynamic precipitations. Also included are wiring diagrams, performance tables, exposed view of shaft assembly, water supply rates. American Air Filter Co., Inc.

STEAM GENERATORS

165 Automatic Boilers — Bulletin 1245, 24 pp, details advantages of company's packaged automatic boilers which provide low-cost steam for heating and processing. Illustrations of both oil and gas fired units are included, along with details on boiler components. Features, tabulated dimensions, weights and ratings for the various models given. Orr & Sembower, Inc.

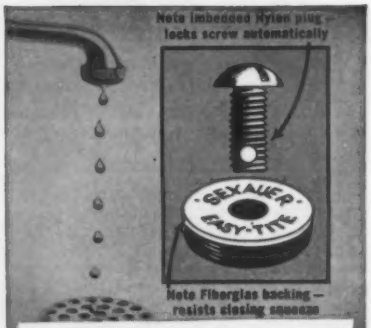
166 Two-Drum Boilers — Bulletin SB-58, 12 pp, describes company's two-drum boilers, which provide high capacity in a compact design that saves space and lowers installation and maintenance costs. Delineates improved features and gives design, construction information. Erie City Iron Works.

WATER TREATING

167 Carryover Solution — Technical Paper 136, "Solving an Unusual Case of Carryover," is a case history of carryover at a paper plant. It points up fact that physical condition of a boiler is also important when steam conductivity goes up. Betz Laboratories, Inc.

168 Cooling Water Treatment — Technical Paper 137, 6 pp, discusses problems of corrosion and tower wood deterioration encountered in recirculation cooling water systems. Tells how concurrent presence of these problems in one plant resulted in plugging of heat exchanger tubes and in high metal loss throughout system. Describes treatment undertaken both to minimize attack of wood and to prevent corrosion. Betz Laboratories, Inc.

169 Cooling Tower Preservation — Application Engineering Data Sheet D-57-1 discusses methods of combatting corrosion and delignification in cooling towers, using controlled volume pumps to meter chemicals to cooling water. Details and drawings explain continuous pH control using Mersemet-


Note imbedded Nylon plug – locks screw automatically
"SEXAUER" EASY-TITE
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Why Faucets Leak

–9 out of 10 washers are fastened with –TOO LONG or SHORT screws. The screws –QUICKLY LOOSEN, thus loose washers –are destroyed thru grind and squeeze –of opening and closing faucets.

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–Used with NEW 'Sexauer' EASY-TITE –faucet washers, this combination out– –lasts past faucet repairs "6 to 1"! –EASY-TITES are made of super-tough, –pliable du Pont compound (neither rub– –ber nor fiber) and reinforced, like a –tire, with a vulcanized layer of Fiber– –glas, they resist distortion and splitting –from shut-off grind and squeeze.

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BULLETINS

(Begins on page 21)

ric pumps, acid metered in proportion to flow rate, chemical feed with level control. Milton Roy Co.

METAL WORKING

170 Metalworking Machinery — This 8-pp catalog illustrates and describes metalworking equipment for ferrous and non-ferrous materials. Included are installation photos of rolling mills, gang slitters, straighteners, tube mill equipment and wire machinery. H. J. Ruesch Machine Co.

171 For Efficient Tooling — Catalog 57, 56 pp, gives detailed information on company's Quick Change tools. Shows correct holder for many types of standard metal working machines, which are listed by make and model number for easy recognition. Besides the holders, catalog shows adaptors boring bars, boring heads, milling machine arbors, face milling cutters and shell end mills and accessories. An engineering information section consolidates information pertaining to tool design. Beaver Tool and Engineering Corp.

172 Carbide Tools — Catalog 57, 36 pp, includes details and prices on a line of carbide tipped drills, reamers, end mills, countersinks, milling cutters, counterbores and centers, chatterless countersinks, solid carbide center laps and solid carbide flute chucking reamers. Shows extended ranges in end mills, also twist drills in straight shank fractional sizes. Net prices are listed adjacent to tool sizes for selection convenience. Super Tool Co., Div. of Van Norman Industries, Inc.

173 Set-Up System — Eight-pp Catalog 557 describes Clamp-N-Jack set-up system for use with boring mills, planers, milling machines, presses and drill presses. Shows typical applications on various types of machine tools. The Universal Vise and Tool Co.

DRAFTING EQUIPMENT

174 Drafting Timesavers — Contained in this 40-pp booklet are 59 shortcuts to speed drafting and computation work, offering new approaches to old problems. A section on calculating ideas gives tips including ways of remembering signs of trig functions, dividing a circle into parts etc. Some drafting shortcuts are presented and an engineering data section gives practical shortcuts to formulas. Also provided are drawing board timesavers, including faster methods of determining gear inertia and interpolating between family of curves. Frederick Post Co.

175 Intermediate Materials — This bulletin tells how use of sensitized intermediate whiteprint materials cuts drafting time, speeds design changes, safeguards originals, and makes complete prints. Contains catalog listings of intermediate papers, intermediate foils and intermediate cloths. Ozalid Div., General Aniline and Film Corp.

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- steel cover is cadmium plated with larger screws designed to fit snugly in opposed corners without protruding inside
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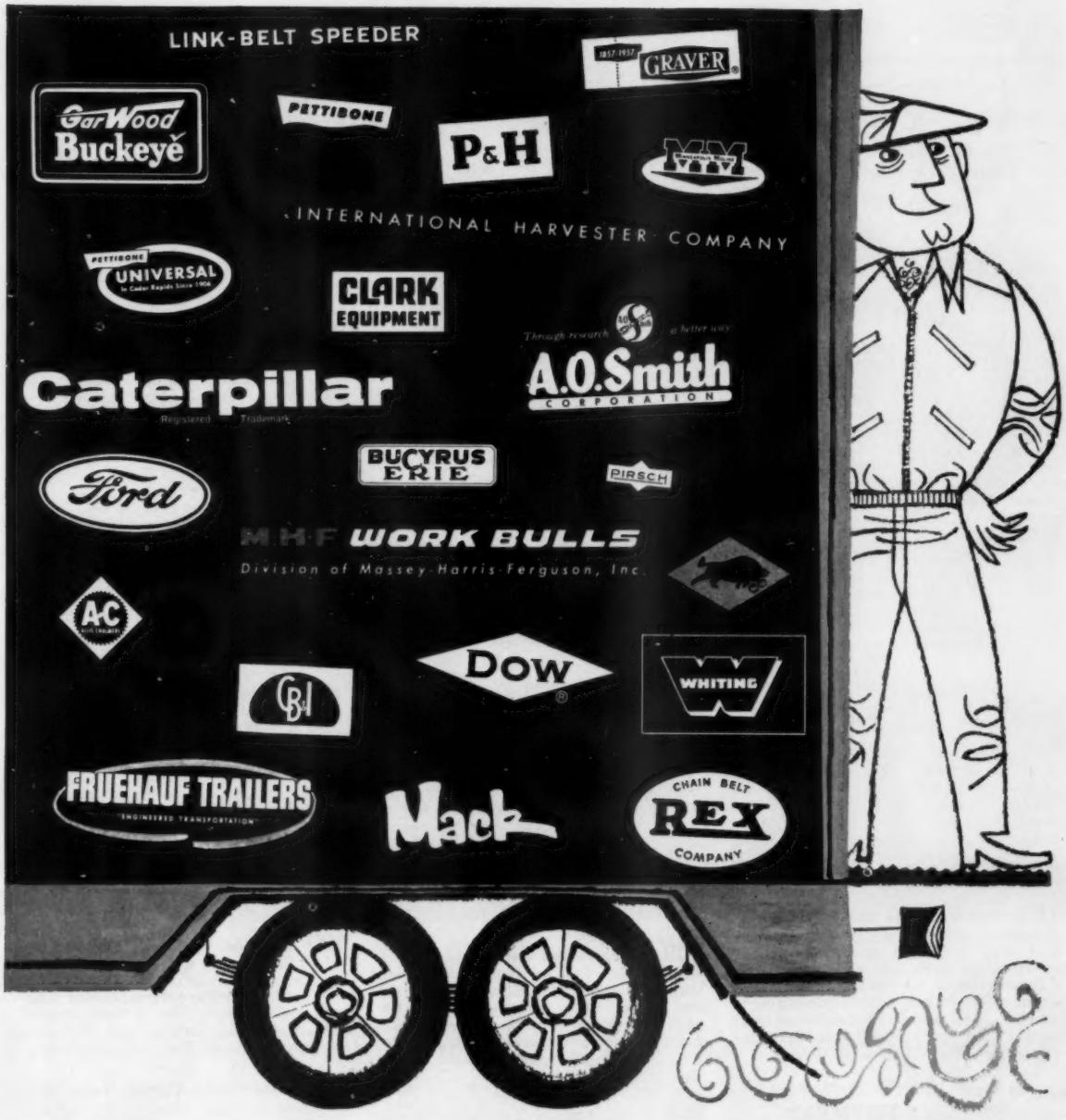

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BULLETINS

(Begins on page 21)

CORROSION PREVENTION

177 On Corrosion Proofing — Selecting best corrosion proofing methods and products, determining comparative resistance of various cement mortars, and calculating quantities needed are outlined in 8-pp revision of company's corrosion proofing manual. Contains tables on corrosion proofing cement mortars, interliners, protective coatings and linings. Pennsalt Chemicals Corp.

178 Solving Corrosion Problems — Documented case histories on use of polyethylene as a chemically inert replacement for metal, rubber and other anti-corrosion materials highlight this 20-pp booklet. Describes successful solutions to corrosion problems encountered in industry and gives savings effected on installation and maintenance costs. Argo Plastic Products Co.

179 Rust, Corrosion Treatment — Bulletin MA describes a treatment for rust and corrosion in steam lines, return lines, radiators and steam heated processing equipment. Causes of rust/corrosion and action of the water treatment are explained. The North American Mogul Products Co.

METALS

181 Electrical Steel Data — Rev. Blue Data Sheet (Edition 6), 20 pp, gives detailed information on company's Electrical Steel 4750, an iron-nickel steel. Typical physical, mechanical and magnetic properties are given, and 16 graphs included. Allegheny Ludlum Steel Corp.

182 Stainless Steel Data—Sixteen-pp Bulletin G-22 gathers together for quick and easy reference much information on stainless steels not usually available. Characteristics of three major types outlined, together with advantages in various applications. A reference table shows their characteristics at high temperatures. The Allen Mfg. Co.

OTHER EQUIPMENT

183 Air Engineering — Bulletin E-57 is a 24-pp air engineering data file covering engineering and test facilities for propeller fans, specifications, construction, maintenance, and installation. Tables for estimating air-handling requirements, entrance and elbow losses and duct sizes are provided. Also included are specifications for special-use equipment, corrosion-resistance and temperature guides, physical fan laws, definitions. Aerovent Fan Co., Inc.

184 Molding Compounds — This 74-pp illustrated handbook details principles of molding and handling Plaskon urea and melamine molding compounds. Compiled as a general guide to proper storage, preforming, preheating, molding, finishing and testing of these materials, its three sections cover basic information on molding; properties of molded products; and general reference material. Diagrams, charts, graphs, and tables provided. Barrett Div., Allied Chemical & Dye Corp.

185 Corrosion-Resistant Seals — Eight-pp Bulletin 938 describes corrosion-resistant seals and stuffing boxes for E, P, and R series vessels, stressing their interchangeability. Discusses five conditions to be considered in selecting best method for closing the opening between agitator and top of reactor. The Pfaudler Co.

186 Feedwater Heater — Bulletin 300, 16 pp, outlines use of feedwater heaters, their economies, and some problems of design. Vertical and horizontal types of installation are described, as are six most common functional designs. A discussion of tube joint fabricating methods and advantages of roller expanding and welding included. The Griscom-Russell Co.

188 Socket Screw Products — This 32-pp revision of company's basic Unbrako catalog reviews in detail the full line of socket screws, plugs, pins, and related products. Catalog includes detailed size-by-size data on diameters, thread specifications, lengths and packing and shipping information in addition to general information on product uses. Standard Pressed Steel Co.

189 Industrial Wire Cloth — Illustrated in this 94-pp catalog is company's line of industrial wire cloth, screens and wire cloth products. Provides complete description of the types and sizes of wire cloth available, presents typical applications and useful metallurgical tables. One section is devoted to standard trade definitions and ordering information. Photos show mesh patterns, many fabrications possible. Book also covers selection. The Cambridge Wire Cloth Co.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 277-278.

INSTRUMENTS, CONTROLS

301 Versatile Electronics — How flexibility of electronic temperature controls makes them useful in a wide range of heating and air conditioning installations is explained in this 16-pp booklet, Bulletin SA-2681. Purpose of publication is to fill the gap between the theory of electronic bridge circuits and specific control layouts and circuit diagrams. Four basic features that give electronic control its flexibility described. Minneapolis-Honeywell Regulator Co.

302 Temperature Controls — Eight-pp Catalog. CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating non-indicating controls; thermometers; bulb installation accessories and process timers. The Partlow Corp.

306 Contact Meter-Relays — Contact meter-relays, versatile instruments that both indicate and control almost any physical or chemical condition that can be detected electrically, are described in 40-pp Catalog 4-C. Supplies complete information for ordering and discusses various circuits for providing different types of control action. The catalog contains complete specifications for the various models and is illustrated with photos and circuit diagrams. Assembly Products, Inc.

307 Stroboscope Data — Applications of the electronic stroboscope are illustrated and described in 8-pp Form 766-B. Includes complete descriptive and specification data on the Strobotac — a small, portable stroboscopic tachometer — as well as on the Strobolux, the Strobolume and the Microflash, used to produce single flashes enabling photos to be made of extremely fast action. General Radio Co.

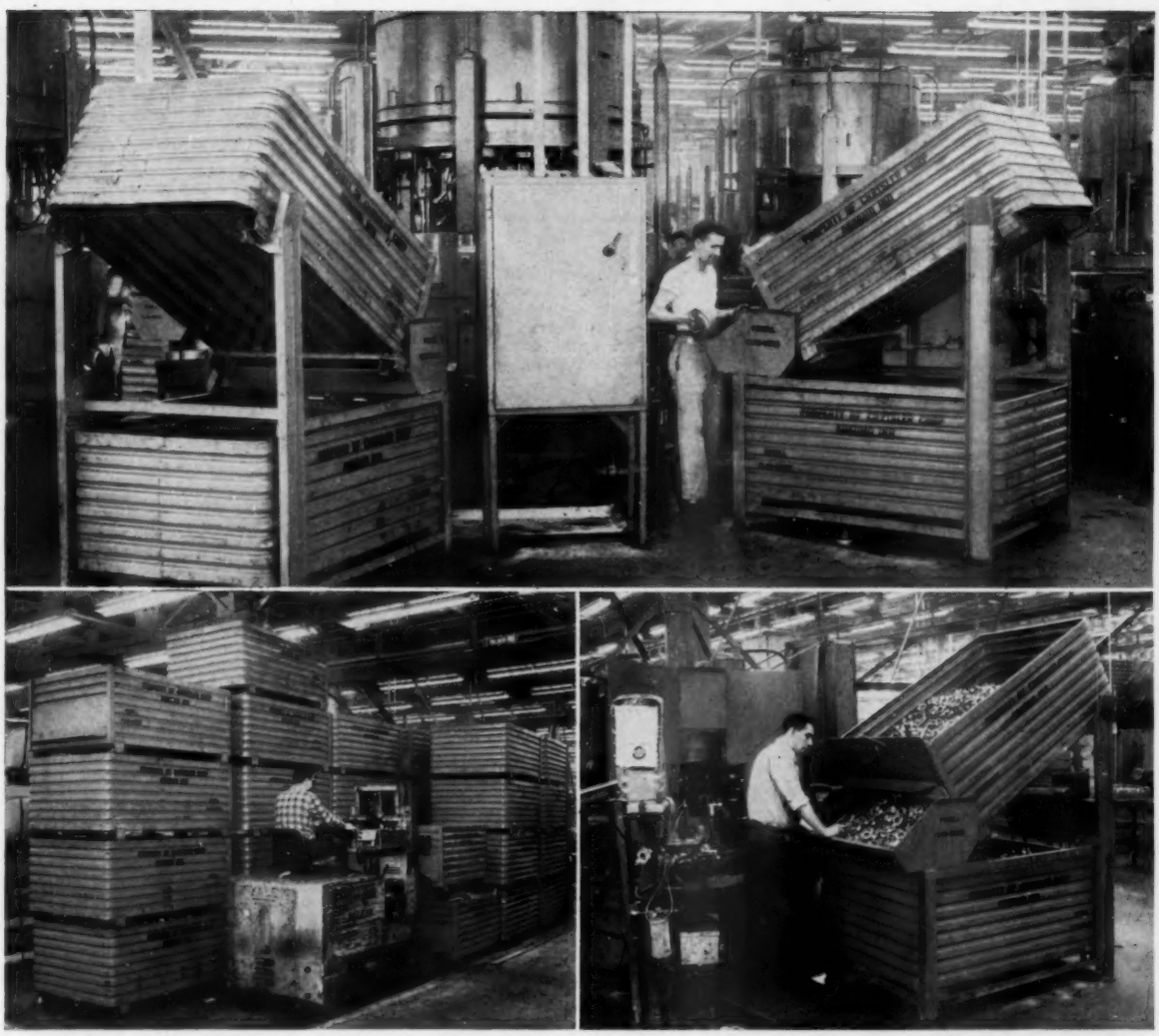
LIGHTING, COMMUNICATION

308 Architectural Floodlighting — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. Also contains tips on floodlighting of vertical surfaces and discusses four "musts" of an efficient economical floodlighting installation. General Electric Co.

309 Outdoor Mercury Lighting — "How Mercury Vapor Outdoor Lighting Brings More Night Action." 8 pp, stresses low cost and versatility of mercury vapor lamps. Shows their uses in industrial areas, parking lots. Sylvania Electric Products, Inc.

311 Illumination Design Data—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. A chapter on interior lighting design describes ways of calculating quantity of light for an area and covers such subjects as selection of lighting systems. Westinghouse Electric Corp.

312 Plant Lighting Planning Guide — This 32-pp handbook of industrial lighting presents economics of plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment and stresses importance of maintenance. Benjamin Electric Mfg. Co.



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Preconceived Mass Handling is possible when a manufacturer designs and builds a plant from the ground up. That's what the Chrysler Corporation did at Kokomo, Indiana. The entire plant was constructed to meet the requirements of a specific operation in the most modern and efficient manner possible. They selected the **Powell Flowmatic*** materials handling system . . . by far the most economical and fastest operating mass handling equipment available today. Literature upon request.

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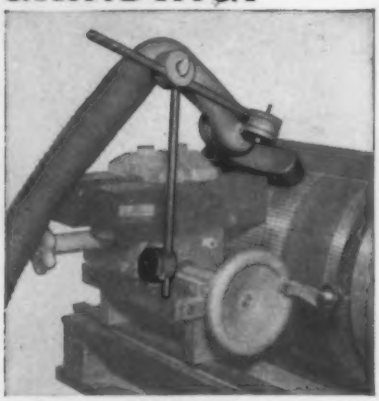

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DATA FILE

(Begins on page 282)

313 Signal Equipment — Tips on how to select suitable signals for any specific operations are offered in one of a series of bulletins—Nos. 100-125—bound in this 40-pp catalog. Other bulletins describe horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

314 Closed-Circuit TV — This illustrated bulletin describes a closed-circuit television system for industrial and institutional use. Information pick-up, selection and control, and information display components are pictured and described, and advantages of closed-circuit television in particular installations are detailed. General Precision Laboratory Inc.

315 Television Equipment — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

ELECTRICAL

317 Totally-Enclosed Motors — Bulletin 500-A describes company's totally-enclosed, fan-cooled motors in ratings from ½ to 40 hp. Ratings and dimensions listed. Robbins & Meyers, Inc.

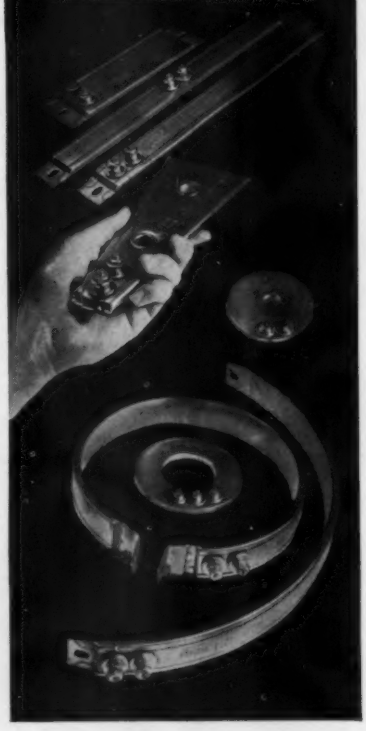
318 Motors — General specifications for company's open drip-proof motors and splash-proof motors, and enclosed motors are contained in 8-pp Bulletin 800. Includes data on construction features, electrical specifications, dimensions. Brook Motor Corp.

319 Control Relay—Eight-pp Bulletin PL 7305-PM describes company's line of control relays, designed to occupy minimum panel space, and available in models with from two to 12 poles. Pictures 10 models, gives dimensions, enclosures, features, and data on maintenance and pole conversion from normally-open to normally-closed. Clark Controller Co.

320 Enclosed Switches — Catalog 83, 28 pp, describes in detail enclosed switches for industrial applications. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements and ratings. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

321 Air Interrupter Switch — Bulletin 100, 8 pp, provides full details on company's high voltage air interrupter switch. The comprehensive description includes case and cutaway photos, multiple position illustrations, dimensional drawings, typical specifications and examples of built-in installations. Cut-

Clean, uniform, exact heat to match the size and shape of your production equipment



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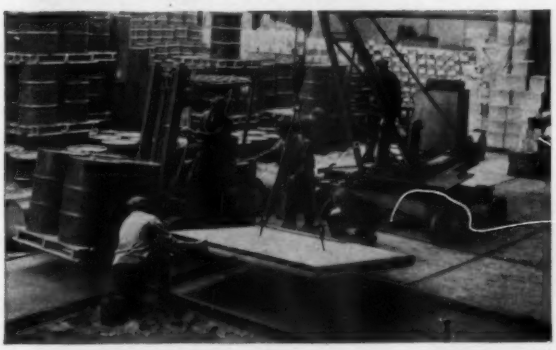
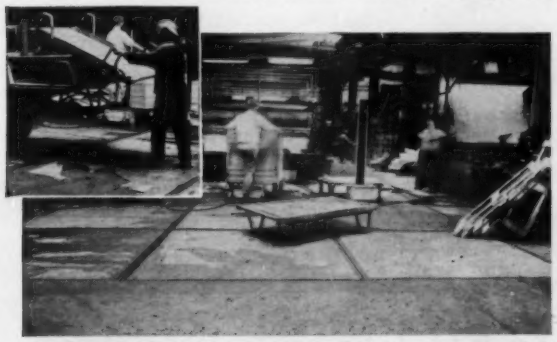
These floor sections, or "Rafts" are made by Stelcon Industrial Floors, Inc.



Stelcon Rafts solve flooring problem at Continental Paper Company, Ridgefield Park, New Jersey.

Says Mr. George Cannie, Continental's Maintenance Supervisor: "The fork lift trucks whip in to the dry end of the paper board machine and lift the loaded skids and spin around with a total weight of close to five tons. Any kind of flooring we've tried before at this critical spot got chewed all to pieces in no time. Those trucks have solid rubber tires on steel wheels and when they slue around fast they really chew into a floor. On top of that, we've got a high-speed 24-hour-a-day production schedule and we just can't treat things gently,



so the men drag these 190-pound skids off a five-foot stack and the steel legs bang down full force, often edgewise, right on the flooring surface. (See illustration)

"This goes on all day and all night here. "It looks as if these *Stelcon Rafts* are going to last longer than any flooring we ever had. But that's not the big point. If ever we get a broken surface in any spot, all we'll do is lift the raft up and replace it with another one. Practically no downtime.

"Formerly we had to wait until our two-weeks shutdown each year to try to repair the flooring. In those two weeks we simply don't have the time to do everything as thoroughly as we'd like to. Sometimes we can't let the concrete cure to full strength before we're back in operation.

"Besides, we might have to operate for months on broken flooring before the annual shutdown comes around. Now we can easily maintain good flooring surface at all heavy traffic and heavy wear spots through the mill, all year."

Comparative tests show superior quality of Stelcon wearing surface and exceedingly high compressive strength

By a special test method simulating the grinding and other deteriorating actions of steel wheels on industrial floors, *Stelcon* floor surfaces have been subjected to the most severe wear and tear in a matter of minutes, comparable to the every day movement of heavy duty traffic over a much longer span of time. Here are the results:

Material	Volume Loss after 480 rotations
Normal concrete	.915 cubic inch
Carborundum	.915 cubic inch
Stelcon Rafts	.183 cubic inch

High Compressive Strength

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Note: Make your own tests. We'll send you a sample of a standard *Stelcon* heavy-duty flooring surface. Test it under the wear conditions in your own plant. It will prove superior to anything you've ever tried.

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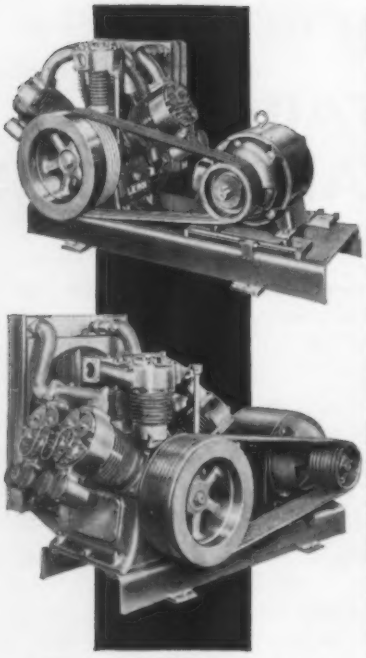

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(Begins on page 282)

away photos illustrate three front-operated types available and photos of installation procedure included. Continental Electric Equipment Co.

322 Low Voltage Switchgear — Twelve-pp Bulletin 6004B presents low voltage switchgear of the metal-enclosed, drawout type for indoor and outdoor installation using Types K and LG air curcuit breakers. Design and construction details are explained and illustrated and emphasis is placed on safety advantages afforded by test position with door closed. Specifications given. I-T-E Circuit Breaker Co.

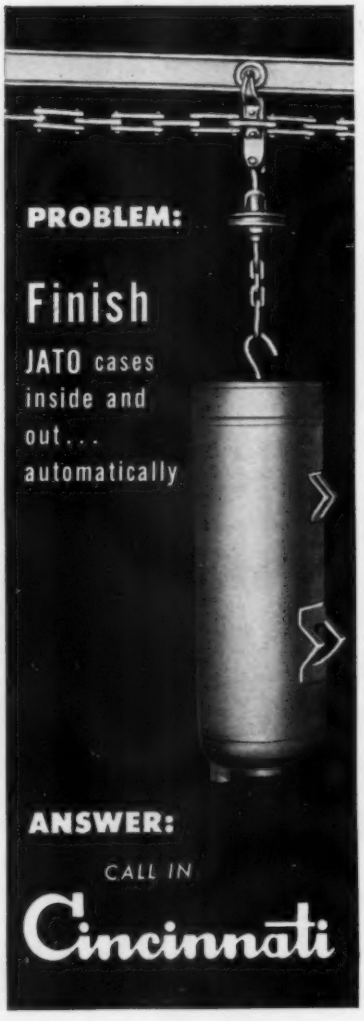
323 Switch Wiring Diagrams — Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Allen-Bradley Co.

324 Electrical Equipment Digest — Electrical equipment illustrated and described in 138-pp Catalog Digest 139, includes load centers, circuit breakers, low voltage control, fusible service equipment, interchangeable hubs, meter equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters, magnetic breaks, relays, contractors other equipment. Square D Co.

326 What You Should Know About Circuit Breakers — Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, in-rush current effects, tripping and reset time. Heinemann Electric Co.

327 Trolley Busway Systems—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electrical equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 50 (44 pp) 100 amp systems; Bulletin 45 (40 pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and descriptions and illustrations of equipment. Feedrail Corp.

328 Wires and Cables — Interlocked armored cable, supports and fittings designed for low cost, heavy duty industrial, power or control wiring are described in this 24-pp bulletin. Photos and specific descriptions of various types of armored cables available for voltages through 15,000 v, single and multi-conductor are included. Arranged in table form are dimensional data, including conductor size, stranding, insulation, sheath and armor thickness, outer diameter and weight. National Electric Products Corp.



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(Begins on page 282)

329 Cable Troughs — This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers and many special fastening devices to save time and labor. Contains full instructions for installations, load charts, accessory items, some installations. The Globe Co.

330 Asbestos Insulation — "Specifications for Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wire and Power Cables," 8 pp, establishes performance tests for asbestos insulation applied as a felted wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 v ratings. Rockbestos Products Corp.

331 Aluminum Conduit Fittings — To fulfill the need for electrical equipment made of materials which resist corrosive attack of many chemicals destructive to ferrous or standard aluminum equipment, Bulletin 2681 presents a broad selection of Condulets and related equipment utilizing copper-free aluminum alloy in their construction. It includes Condulets, lighting fixtures, plugs and receptacles and others for both hazardous and non-hazardous locations. Crouse-Hinds Co.

332 Handbook on Storage Batteries —This 64-pp booklet on instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

333 Motive Power Batteries — This 48-pp general service manual on lead-acid batteries for all types of motive power application is a practical guide to industrial cycle service, including industrial truck, air conditioning, and others. Includes photos, charts, tables, methods of repair, maintenance and theory of operation, instructions covering repairs with regular or special tools, simplified testing methods, including safety practices, acid handling precautions. C & D Batteries, Inc.

335 Commutator Slip Ring Maintenance — This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance. Ideal Industries, Inc.

336 High-Capacity Fuses — Form HCS, 6 pp, describes fuses of unlimited interrupting capacity on voltages to 600, designed to afford protection for loads of 600 to 5000 amp. Includes test data, charts on opening time, current limiting effect. Bussmann Mfg. Co.

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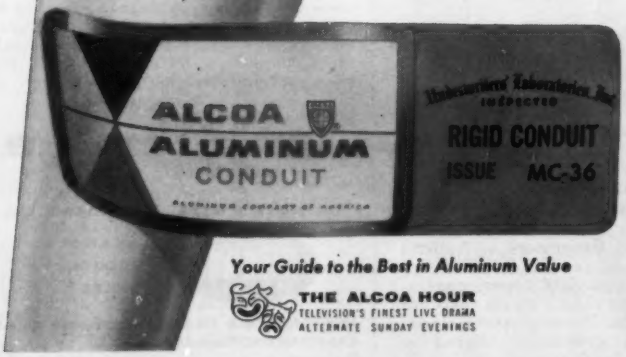

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337 Testing Instruments — Bulletin 19-56, 16-pp, features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor rotation tester, cable fault locating equipment, transformer turn ratio test sets, corona test equipment, frequency meters, tachometers, others. Includes photos and descriptions of each type, including chief features, operating ranges, and suggested applications. James G. Biddle Co.

338 Flexible Cords — This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on selection. Whitney Blake Co.

BOILERS, AUXILIARIES

340 Preheating Combustion Air — This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels. Air Preheater Corp.

341 Hot Water Boilers — Catalog HCC-2, 20 pp, describes and illustrates design, construction, advantages and economics of company's controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. Comparison of heat content—water vs steam— is included on table, and schematic layouts are included. Combustion Engineering, Inc.

342 Shop Assembled Boiler — Sixteen-pp Bulletin G-76 completely describes and illustrates company's Type FM water-tube integral-furnace boiler, made in standard sizes from 2900 to 28,000 lb of steam per hr, pressure to 250 psi. The Babcock & Wilcox Co.

343 Package Boilers — This 12-pp booklet on package steam generators describes the formulas behind all package steam generators, and illustrates how installation of a package steam generator can raise steam capacity in an existing boiler room without extensive structural changes. Shows plant operators how to make survey of their own steam requirements. Cyclotherm Div., National-U. S. Radiator Corp.

344 Automatic Boilers — Bulletin BE-4 describes operation and advantages of manufacturers automatic boiler's spinning gas technique—a method of obtaining maximum heat transfer with a simplified design. Shows cutaway view of boiler construction. Boiler Engineering & Supply Co., Inc.

345 Standard Generators — Bulletin B-55-4 describes company's SC economy series of standard steam generators designed to reduce steam costs for industrial plants. Pre-engineered, standardized steam generators offered in

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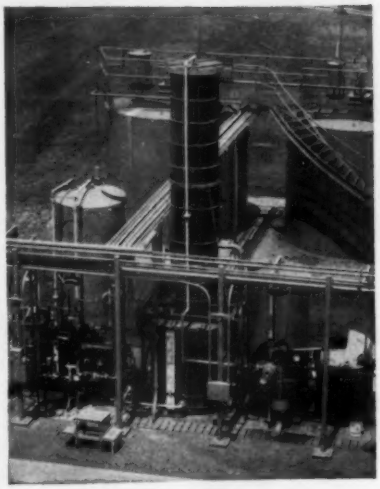

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(Begins on page 282)

nine sizes with capacities of from 50,000 to 150,000 lb per hour are described, and schematic and cutaway drawings of the units and design features are included. Foster-Wheeler Corp.

WATER TREATING

346 Feedwater Treatment — Process Bulletin B1, "Treatment of Boiled Feedwater by the Direct, or Indirect Method," discusses advantages of direct treatment, as a complete treating program or as a supplement to external systems. Explains why direct treatment is convenient, economical, and complete. National Aluminate Corp.

347 Mixed-Bed De-Ionization—Practical equipment for mixed-bed de-ionization at flow rates of 5 gal per hr to 5000 gpm is described in this 8-pp illustrated bulletin. Advantages of the mixed-bed de-ionizer are detailed. Illinois Water Treatment Co.

PUMPS, COMPRESSORS

349 Continuous Flow Pump — Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes specifications. Robbins & Myers, Inc.

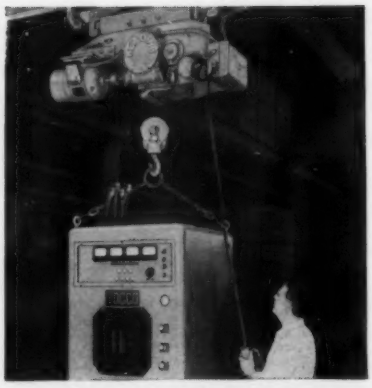
350 Submersible Pumps — Bulletin P55-123, 12 pp, describes advantages of company's submersibles and tells how they solve various pumping problems. Design features are illustrated through cutaway views. Four basic types are shown, and a handy selection chart is included. Byron Jackson Co.

351 Pump Data — Application and capacity data on company's line of pumps, including centrifugal pumps, screw pumps, reciprocating pumps, and rotex pumps, are presented in this product bulletin. Photos of each of the models, along with descriptive detail, are included. Warren Pumps, Inc.

352 General Purpose Pumps — Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. Viking Pump Co.

353 Industrial Pumps — A number of different types of industrial pumps for a variety of applications are illustrated and described in this pamphlet. Size and capacity data are listed for each type. C. H. Wheeler Mfg. Co.

354 Condensation Pumps—Eight-pp Bulletin 1403 describes company's line



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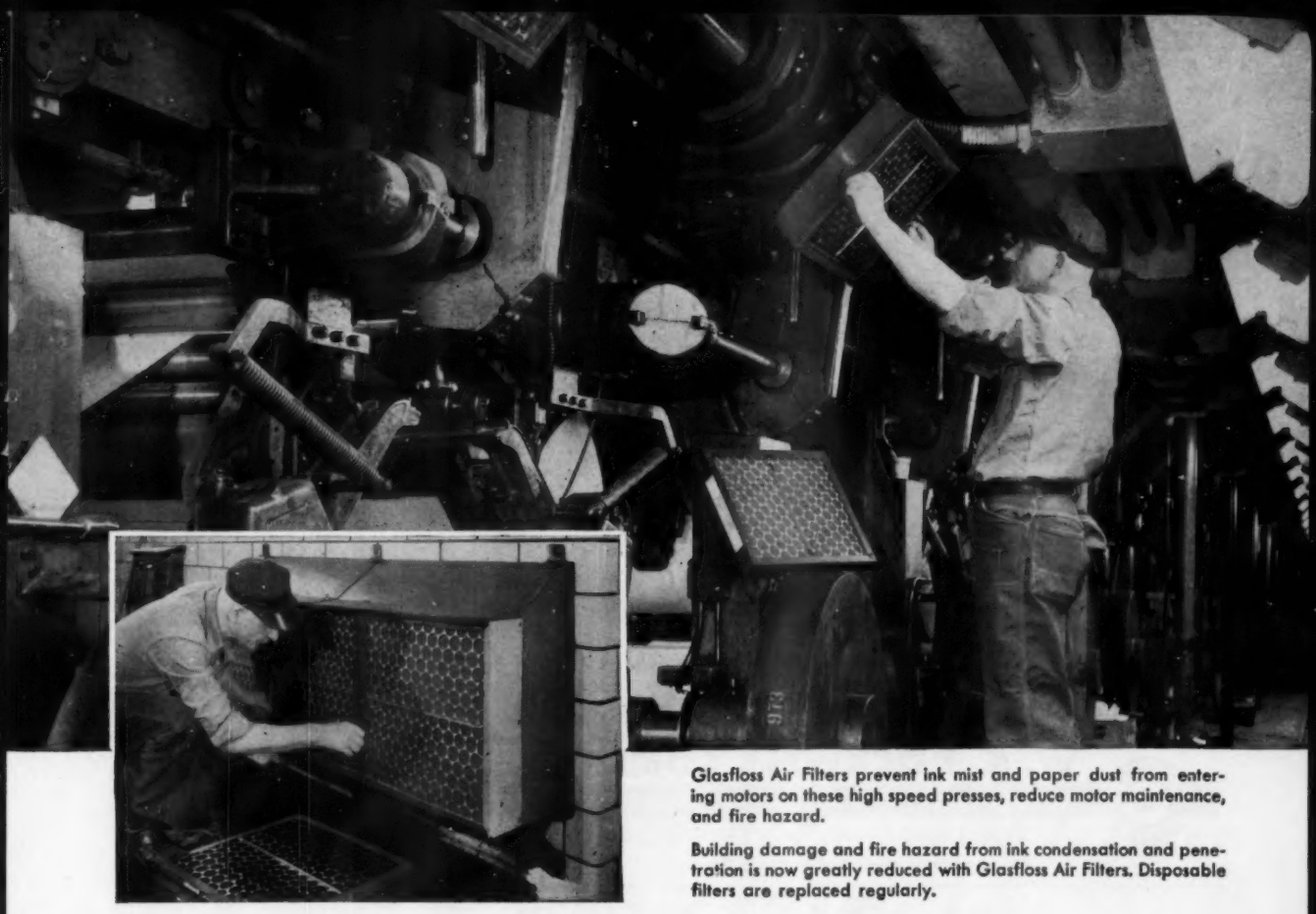

Glasfloss Air Filters prevent ink mist and paper dust from entering motors on these high speed presses, reduce motor maintenance, and fire hazard.

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OFFICES IN 56 PRINCIPAL CITIES

For more facts circle 700 on Reply Card

DATA FILE

(Begins on page 282)

of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment. Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. Dunham-Bush, Inc.

356 Industrial Compressors — Bulletin SSB-56 covers company's complete line of industrial air compressors from the ½ hp to 150 hp, including the accessories that go to make a complete installation. Photos of the various models are included, as well as specifications and dimensions. Schramm, Inc.

358 For On-the-Spot Air—Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustrations pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

PACKINGS, GASKETS, SEALS

360 Teflon Products — Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP522 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

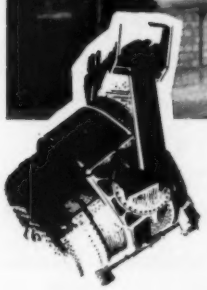
361 Improved Packings — Advantages of company's Chevron packings for rams, plungers and reciprocating rods are illustrated and described in 8-pp Catalog AD-115. Tables show general recommendations for packings against various pressures, approximate depths. The Garlock Packing Co.

MECHANICAL POWER TRANSMISSION

362 Roller Chains, Sprockets — Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taperlock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists. Diamond Chain Co.

364 Fluid Drive — Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1-through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables given for direct connected and V-belt types. American Blower Corp.

365 Adjustable Speed Drives — Bulletin P B-4700-1 describes company's



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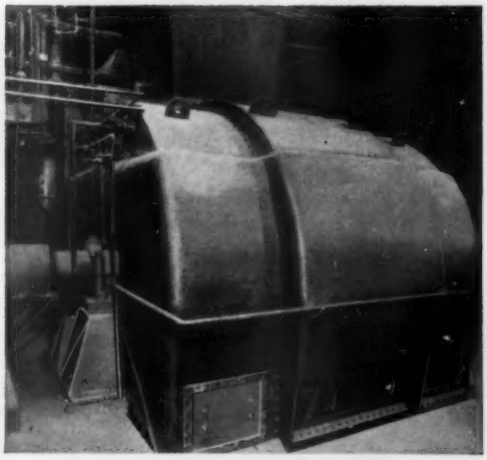
600 TONS— enough steel in each heat for 300 automobiles. That's the capacity of Weirton Steel Company's new open hearth furnace at Weirton, W. Va. Weirton Steel is a division of National Steel Corporation.

Designed and built by Loftus Engineering Corporation, Gateway Center, Pittsburgh, this giant is completely automatic in operation.

As for so many other impressive installations, Clarage equipment was selected — a Clarage induced draft fan for the waste heat boiler and a Clarage forced draft fan for the furnace.

Investigate the advantages Clarage equipment offers for YOUR mechanical draft installations. Contact our nearest sales engineering office or write us for complete literature. CLARAGE FAN COMPANY, Kalamazoo, Michigan.



Clarage heavy-duty fan provides induced draft for waste heat boiler.

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DATA FILE

(Begins on page 282)

packaged adjustable speed drives — covering latest developments in design and construction. Tells how these packaged, pre-wired, pre-assembled units provide flexibility of d-c motor performance from an a-c power supply, and offer simple, speed adjustment. Crocker-Wheeler Div., Elliott Co.

366 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are detailed. Thomas Flexible Coupling Co.

367 Spacer Coupling—Of special interest to plant engineers concerned with operation of many pumps is Manual 4838 on this company's Type F Steelflex spacer coupling which has a quick-disconnect feature. Step-by-step illustrations show how to install, remove coupling and lubricate it during assembly. The Falk Corp.

368 Clylindrical Roller Bearings — Multi-Row cylindrical roll neck bearings are described in 24-pp Form 436. Contains complete engineering and technical data on cylindrical roller bearings designed for heavy-duty service in roll neck mountings on hot and cold rolling mills. Typical installations are illustrated, and mounting and discounting, capacities. SKF Industries, Inc.

369 V-Belt Economy — Disadvantages of makeshift and other ill-advised means of coping with stretched or broken V-belts are discussed briefly in this folder. Answers questions on V-belt maintenance, inventory, wear. The Manheim Mfg. & Belting Co.

VIBRATION CONTROL

371 Improved Machine Mounts — This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased machine mobility, reduce maintenance costs, lessen noise. Barry Controls, Inc.

372 Vinyl Machinery Mount — Advantages of company's vinyl machinery mount are outlined in this illustrated brochure. Installations are shown. Clark, Cutler and McDermott Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

375 Portable Electric Tools — This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners and others. The Black & Decker Mfg. Co.

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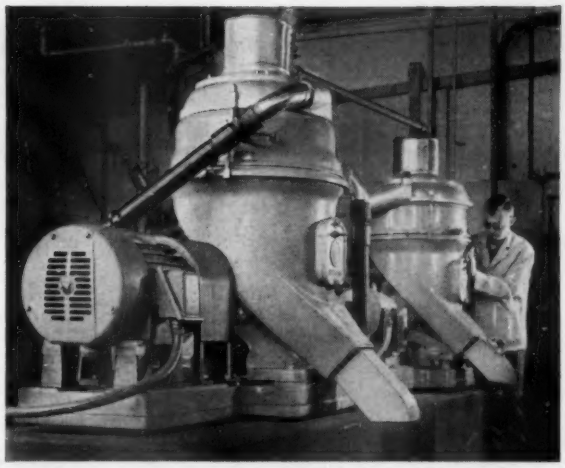

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DATA FILE

(Begins on page 282)

376 Pipe Tool Ordering Guide—Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs etc. Armstrong Bros. Tool Co.

378 Pipe Tools — Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R-5. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. Capacity, price data included. The Ridge Tool Co.

380 Industrial Tools — Hand tools and shop tools for production lines, maintenance work and service departments are featured in 108-pp Industrial Catalog 54-1. Loaded with pictures and tool facts, the book describes in detail the complete line of over 4,000 tools — including chests and cabs, wrenches and sockets, screwdrivers, pliers. Snap-on Tools Corp.

381 Portable Tools — Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metalworking industries are described in this 50-pp catalog. Tools appear in logical sequence of size and duty rating. Specification tables at bottom of each page permit easy selection. Skil Corp.

382 Electrode Guide — Catalog 1318 is a 58-pp pocket guide to electrode selection. Mechanical properties and testing of electrodes, specifications, classification and properties of electrodes, are among the data featured, and different types of electrodes are described. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

MAINTENANCE

384 Basic-Roofing Information — "What You should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of good re-roofing job. Johns-Manville.

386 Handbook on Coatings — This 1957 Coatings Manual is a 32-pp treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. Illustrated in full color, this book contains information and recommendations to enable accurate determination of specific coatings needed for the job. Basic principle of Rust-Oleum's fish oil penetration into pores of metal is illustrated. Application photos give new ideas for protecting girders, tanks, boilers, roofs, other surfaces. Over 100 color chips. Rust-Oleum Corp.

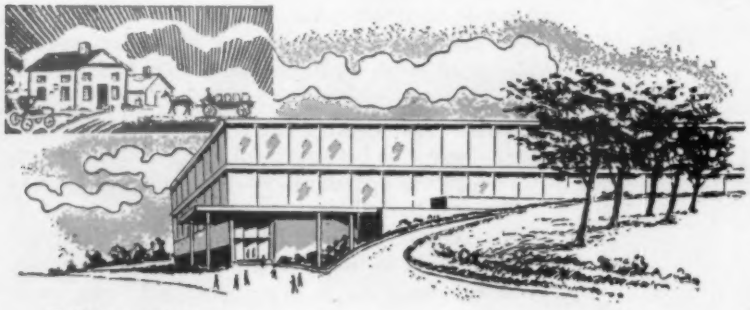
388 Protective Paint — Thirty-five case histories of successful use of protective coatings based on chlorinated rubber are included in this 20-pp bulletin, "Protection with Parlon." Photos show water and sewage tanks, and chemical and food processing plants where these coatings have had long-term exposure. Hercules Powder Co.

389 Tips on Corrosion Prevention — How Bitumastic protective coatings aid in fight against corrosion is told in this 12-pp booklet. Discusses corrosion as a universal industrial problem, role of protective coatings in cutting costs and lengthening service life of structures and equipment, and gives data on several coal-tar-based coatings intended to solve a variety of corrosion problems. Koppers Co., Inc.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 277 and 278.

390 Guide to Maintenance Products —Catalog 56, 48 pp, on industrial maintenance paint products lists specialized coatings to resist alkalies, acids, oils, grease, moisture. A complete buyers' guide, this book includes, besides maintenance coatings, waterproofing, roof coatings, caulking compounds, floor patching materials. Gives technical information. Steelcote Mfg. Co.

391 Repairing Concrete Floors — A seven-step procedure for repairing con-



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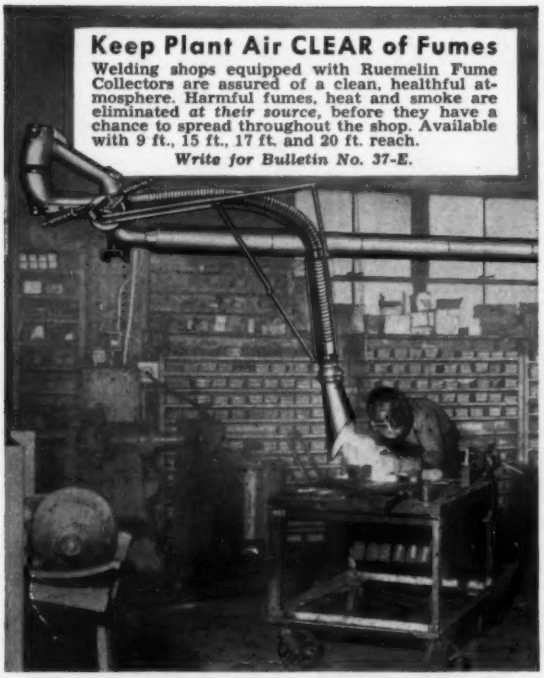

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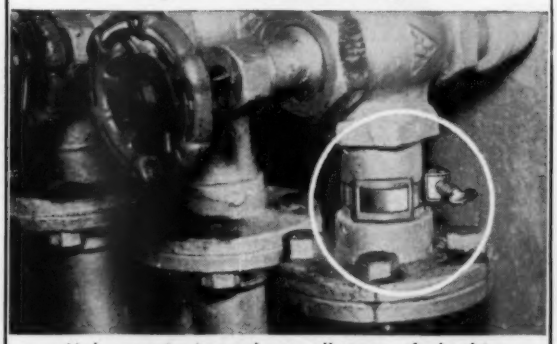

Make repairs instantly on all types of plumbing. Marman Patchmaster Pipe Leak Clamps attach quickly, hold tight, resist corrosion. Write for Bulletin and name of your nearest Marman Distributor.

Universal Patchmaster

Series 7126 Adjustable Patchmaster Clamps stop pipe leaks at pressures up to 800 psi. Stainless steel patch plate and clamp, synthetic rubber pad conform to any pipe contour. Sizes for ½" to 4" pipe.

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Series 7550 Heavy Duty Patchmaster Clamps provide a quick, easy way to stop high pressure pipe leaks. Permanently repairs leaks and splits in all types of pipe. Flexible, corrosion-resistant band and component parts conform to pipe irregularities. Will not collapse weak pipe. Oil and gas resistant gasket. In pipe sizes from ½" to 8" and a large range of lengths.

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DATA FILE

(Begins on page 282)

crete floors with non-shrink mortar is described in this folder, EPMM-4. Each step is illustrated with an actual photo and description of step involved. The Master Builders Co.

392 Better Floor Care — This Illustrated folder describes products designed to aid efficient floor care. Lists combination Scrubber-Vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other equipment. Finnell Systems, Inc.

393 Light Scaffolds — This series of illustrated bulletins describes company's line of aluminum alloy Up-Right scaffolds and accessories. Pictures one-piece sections and multi-section models with various ranges of adjustability. Points out such features as locking hooks which provide automatic security and locking casters for safety on stairways and inclines. Up-Right Scaffolds Div., Up-Right, Inc.

SLINGS, WIRE ROPE

394 Sling Handbook — The 64-pp Tuffy Sling Handbook is replete with illustrations, charts and diagrams describing 16 factory fitted slings and nearly two dozen standard fittings available for slings, including several which are recent additions to the line. Book contains a complete rigger's manual, shop chart of ratings, an engineer's notebook and standard signals for directing operations of overhead traveling cranes. Union Wire Rope Corp.

395 Preformed Wire Rope — Stainless steel and monel metal preformed wire rope is described in this informative bulletin. Constructions of different type of wire rope are illustrated, typical uses are listed, and engineering information charted. Macwhyte Co.

CONSTRUCTION

397 Aluminum Building Products — Form AD 285 is a 32-pp catalog covering company's line of aluminum industrial building products. Cites advantages of aluminum, pictures some installations. Installation data, weights, dimensions and roughing-in details are provided on corrugated roofing and siding, V-beam roofing and siding, ribbed siding sheet, perforated corrugated sheet, flat flashing sheet. Aluminum Co. of America.

398 Standardized Construction—This 28-pp illustrated catalog on company's system of standardization in building construction presents a description of "F" buildings, a versatile series of flat-roof structures. Luria Engineering Co.

399 Partitions and Walls—Low cost sound-absoring partitions and walls designed for movable and flexible office enclosures are featured in this illustrated bulletin. Dimensional diagrams and specifications are included, also installation photos. GR Products, Inc.

400 Panel Wall Construction—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q35-55. Includes installation photos, diagrams, specifications, as well as drawings, pointing out structural details. H. H. Robertson Co.

402 Window Modernization — How to modernize old windows with company's glass blocks is told in 8-pp Bulletin GB-104. Selection data is included, along with photos of typical installations. Pittsburgh Corning Corp.

403 Replacement Glazing — Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

404 Wire Partitions—The modern, economical approach to plant layout problems is described and illustrated in 8-pp Bulletin P-55 on wire partitions and custom enclosures. Describes important design and construction features. Wire and Iron Products Inc.

405 Steel Floor Plate — Skid resistance and other advantages of multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allowable loads. United States Steel Corp.

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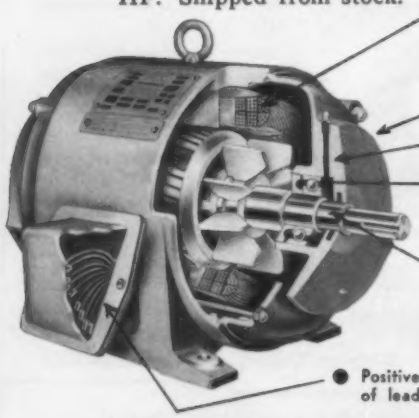
Design is based on over half a century of experience. Built to surpass NEMA Specifications, yet cost no more than ordinary motors. Single and polyphase. All major types. 1 to 600 HP. Shipped from stock.



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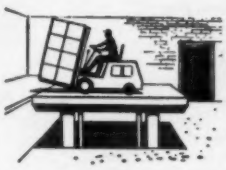

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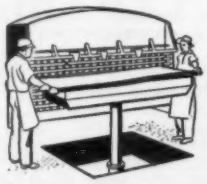

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industrial fans

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Easily mounted in any position with 4 bolts. For air supply or exhaust. Heavy welded-steel construction. High-volume air movement. Sizes 24" to 48".

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Designed for use in all standard duct systems. More efficient performance at lower speeds, against static pressures to ¾" S. P. Sizes 24" to 48".

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Aerovent FAN CO. INC.

Ash and Bond Sts. Piqua, Ohio

For more facts circle 715 on Reply Card

DATA FILE

(Begins on page 282)

406 Grating and Treads — Bulletin 2527 is a 26-pp, illustrated bulletin on grating and treads for a variety of applications. Presents descriptions of electroforged, riveted, rectangular, diagonal, U-type and T-interlocked grating and treads. Tables of safe loads and information on specifying are also included. Blaw-Knox Co.

407 Storage Equipment — Catalog 100-E, 72 pp, illustrates and describes company's complete line of steel cabinets, folding chairs, chests, and safes, stools, tool boxes, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and specifications, installation photos. Lyon Metal Products, Inc.

408 Adjustable Shelving — How this shelving can save assembly time is explained in 28-pp Form 2111. Photos and drawings of various types of shelving units, including open and closed shelving, bin units, ledge shelving, counter shelving, cabinets with swinging and sliding doors, parts and accessories are included. Standard Pressed Steel Co.

MATERIALS HANDLING

410 Overhead Cranes — Bulletin T202, 20 pp, gives full information on top running double girder cranes with top running trolley in capacities from 2 to 12 tons, spans to 60 ft. Data is also given on top running single girder cranes, both motor driven bridge types and head geared or push type in capacities from 1 to 10 tons, spans to 50 ft. Chicago Tramrail Corp .

411 For Overhead Handling—Booklet 2008-M, 12 pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track sections are included. Among subjects covered are various carriers for hand, electric and automatic operation; tractors; track switches; standard cranes. Cleveland-Tramrail Div., The Cleveland Crane & Engineering Co.

412 Overhead Dispatch System — Form F 192, 8 pp, describes an automatic overhead dispatch system designed to solve a variety of materials handling problems. Outstanding advantages are listed and typical installations are described and illustrated with detailed diagrams. Component equipment utilized in this system is individually illustrated, described. Richards-Wilcox Mfg. Co.

413 Floor Type Conveyors — Catalog 51, 90-pp, contains engineering data on company's line of floor type conveyors, including belt conveyors, apron conveyors, bulk handling conveyors, chassis assembly conveyors, drag conveyors, flight conveyors, foundry block conveyors, log conveyors, mould conveyors, package handling conveyors, piano hinge conveyors, and others. Also covers other conveyor equipment such as chains. Jervis B. Webb Co.

415 Steel Conveyor Belts—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp builetin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

416 Conveyor Belt Chart — Engineering data for standard conveyor belt construction is given in this chart and accompanying sheets. Strength characteristics of eight popular ply and material combinations of conveyor belt constructions given. Quaker Rubber Corp., Div., H. K. Porter Co., Inc.

417 For Bulk Materials — Latest information on equipment for storing and handling bulk materials is contained in 12-pp Bulletin 574. Descriptions, specifications and dimensions of vertical and horizontal tanks are included. Cost savings afforded by bulk storage and handling facilites noted. The Day Co.

418 Handling Cost Cutter — Bound in loose-leaf style, the Materials Handling Cost Cutter tells how mechanized materials handling can cut handling costs in a variety of jobs and industries. Case histories of actual applications are cited, equipment and methods described, and a list of trucks and attachments "keyed" to the particular job and field. Profusely illustrated. Automatic Transportation Co.

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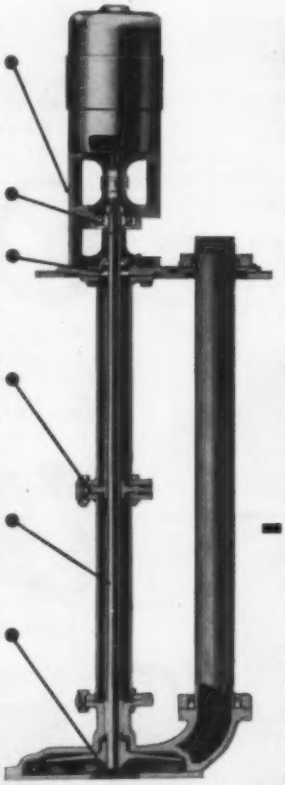

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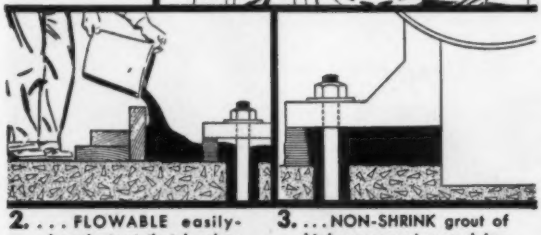

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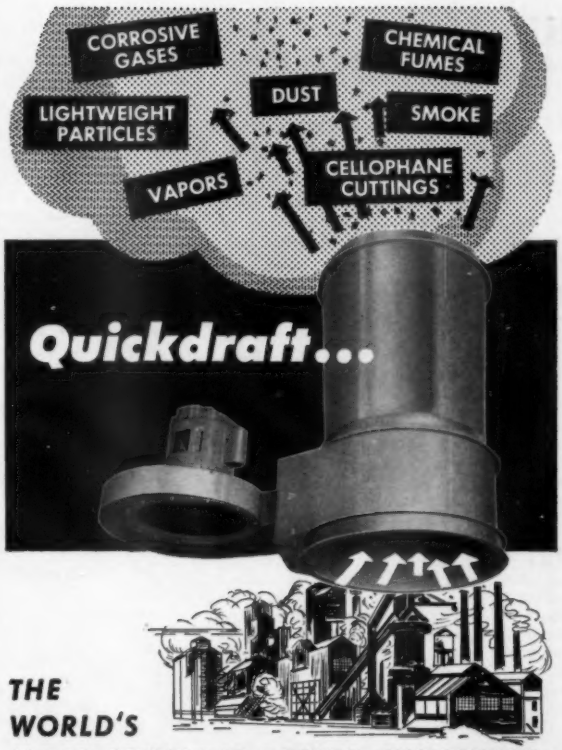

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DATA FILE

(Begins on page 282)

419 Electric Fork Trucks—Two electric fork trucks designed for high maneuverability, ease of maintenance, and operator comfort and convenience are introduced in two 6-pp bulletins. Bulletin 1324 covers a 4000-lb capacity model; Bulletin 1325, a 6000-lb truck. Baker-Raulang Co.

420 Cost-Cutting Materials Handling — "The How Book of Cost-Cutting Materials Handling," is a 24-pp booklet covering various phases of the materials handling problem and their effect on industrial production. Text and pictures cover such subjects as fundamental handling motions, advantages of planned material handling practices, analysis of handling organization, collecting handling data, diagramming route of travel, and the use of equipment. The Yale & Towne Mfg. Co.

421 Chain Hoists — Catalog 61, 20 pp, describes construction and design features of company's multiple gear chain hoists, with a large cutaway view showing component parts included. A table of dimensions is given, as well as dimensional diagrams, shipping information, parts list prices and other pertinent data. Reading Crane & Hoist Corp.

422 Electric Hoists—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

423 Load-Lifter Cranes — Catalog 218-C, 20 pp, includes illustrations, descriptions and outline dimensions of company's Load-Lifter cranes, ranging from small push type crane bridges to large capacity hand operated cranes and also including cranes with electrically operated hoists for "stand-by" service. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

424 Heavy Duty Electric Hoists — Bulletin 142-G, 24 pp, contains illustrated data on company's line of heavy duty electric hoists, including lug suspension, hook suspension, with plain trolley, with geared trolley, with motor driven trolley, and the 5-ton capacity models. Advantages are detailed and component parts illustrated with photos, drawings and diagrams. Specifications included. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

425 Oil-Hydraulic Lifts — Catalog RE-203, 20 pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank for powering oil-hydraulic devices. Rotary Lift Co.

426 Electric Freight Elevator — Bulletin A-414, 12 pp, contains design and operation information on company's plunger electric freight elevator designed for low-rise, light and heavy duty freight handling requirements. A sectional diagram points out component parts, and an installation diagram and sizes included. Otis Elevator Co.

428 Automatic Dockboards — Bulletin D-160 describes company's automatic dockboards for fast, safe mechanized materials handling. Features of the dockboards are illustrated and described, and general specifications included. Bulletin 181 covers specifications and layout for recessed models and package units. The Kelley Co., Inc.

429 Automatic Ramp — Power-operated, automatic-leveling dock ramps for either air-oil (air compressor) or electric operation are described in this 6-pp bulletin. Design and construction features are illustrated, and specifications are included. Globe Hoist Co.

430 Self-Dumping Hoppers—Bulletin 250 describes self-dumping hoppers reported to cut cost of hand unloading at least 50 per cent. Details rugged construction of the units, safety catch incorporated, other features. Standard models are pictured, as are some typical jobs handled. Roura Iron Works.

431 Industrial Casters — Various types of casters for industrial applications are pictured and described in this large chart designed for wall mounting. Covers light duty, light-medium duty, medium duty, medium-heavy duty,

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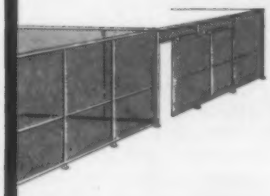

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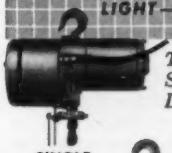

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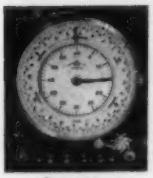

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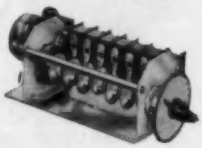

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DATA FILE

(Begins on page 282)

heavy duty, extra heavy duty, trailer series, and special duty casters; gives selection data. Faultless Caster Corp.

432 Casters and Wheels — Catalog 138 is a 191-pp product manual on company's line of casters and wheels, describing design features and listing full specifications. Photos and drawings are used profusely to illustrate data, covering furniture casters, wheels, glides, desk shoes. Darnell Corp.

FANS, VENTILATING

434 Industrial Fans—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data on Tubeaxial and Stackbooster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

435 Propeller Fans — Pictorial Bulletin FM-2345, 24 pp, describes design and fabrication of heavy-duty propeller fans and related package units. Covers various types of power roof ventilators, water coolers, heat pump installations, dual service condenser, and evaporator packages, fan assemblies for dry coil condensers, air washer and scrubber installations, stainless steel equipment. Buffalo Forge Co.

436 Industrial Fans — Bulletin 702A features company's line of fan equipment for industrial air and material handling applications. Photos illustrate various types available, and complete descriptive detail and a table of general data are included. Clarage Fan Co.

437 Roof Ventilators — Sixteen-pp, Bulletin A-112, revised, covers manufacturer's line of reversible roof ventilators, also penthouse Vertijet, rotary and other models. Sizes, specifications, performance data are included. Hartzell Propeller Fan Co.

SPACE, PROCESS HEATING

438 Plumbing, Heating Supplies — Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

439 On Unit Heaters — Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories. American Air Filter Co., Inc.

440 Revolving Unit Heaters — Bulletin HR-6A, 16 pp, features revolving unit heaters for industrial plant heating, presenting design and construction details and showing typical installations. Engineering data, mounting heights and coverage, and dimensions are tabulated, and dimension drawings are included, along with installation tips. L. J. Wing Mfg. Co.

441 Electric Heat, 101 Ways — Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheather electric heating units are being used. Physical aspects of installation are detailed along with a discussion of the problem, solution and advantages obtained. To illustrate liquid heating, diagrams and photos show best applications for the elements and heaters. Edwin L. Wiegand Co.

OTHER EQUIPMENT

442 Neoprene Design Book — This illustrated Bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures. Elastomers Div., E. I. du Pont de Nemours & Co.

443 Brinemaking Manual — Details on modern brinemaking methods and equipment are presented in 12-pp Manual 135. Three types of brinemakers are described, as well as a wet salt storage system, and cutaway views and diagrams are included. Morton Salt Co.

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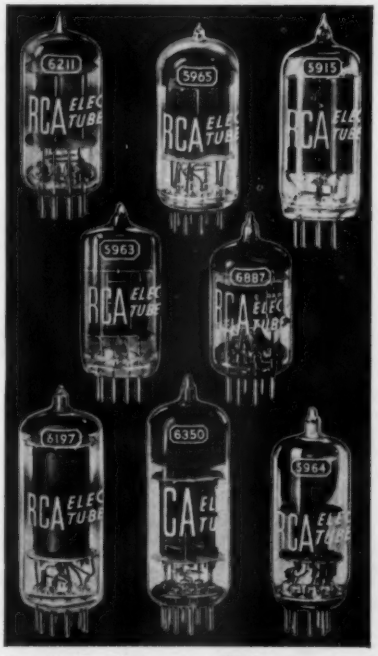
RCA COMPUTER TUBES

for

Sustained Reliability



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Radio Corporation of America

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For more facts circle 729 on Reply Card

How Hartzell Duct Fans Help Cut Ventilating Costs

Lower Equipment Cost

Hartzell fans are competitively priced . . . yet they're designed and built for maximum reliability and long life. When you compare prices, estimate the service life of each make and rank them on the basis of cost per year of useful life. On that basis, Hartzell fans will always be by far your best buy.

Lower Installation Costs

Hartzell duct fans are much easier to install than many other types of ventilating equipment which might be used to do the same air-moving job. Each fan is a completely pre-fabricated duct section. To install a Hartzell duct fan you need only cut a section of duct work the same length as the fan, bolt angle iron flanges to the duct ends and bolt the fan to the flanges. After that, just install bracing and make electrical connections and you're done. Easy installation means fast installation . . . and real savings on costly labor charges.

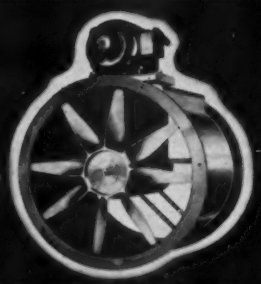
Lower Maintenance Costs

Hartzell duct fans require practically no maintenance. Their rugged construction and the high standards of quality in workmanship and materials to which they must conform practically eliminate failures under normal operating conditions. Routine maintenance requires nothing more than periodic lubrication and occasional replacement of belts. Motors on direct-drive models and bearings on belt-drive models are Alemite-lubricated from outside the duct. Belt changes or adjustments on belt-drive models are also conveniently made from outside the duct. Hartzell design and construction holds maintenance to a minimum . . . and that's a vital consideration under today's wage scales.

For complete details on Hartzell duct fans and how they can help you cut your air-moving costs, just call your nearby Hartzell field engineer. If you don't know him, just drop us a line for his name and address. And be sure to ask for Bulletin A-109.

Why You Can Count on Hartzell Air-Moving Equipment for Long Life, Rugged Reliability and Minimum Maintenance

Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.



BELT DRIVE DUCT FAN

These fans are the best choice for most installations where air (including that containing fumes, corrosive elements or dust) must be moved through a duct. Fourteen sizes, 12" to 60" fan diameters; single-propeller, two-propeller or multi-blade models in belt-drive or direct-drive construction.

BI-PASS DUCT FAN

This special model, with motor mounted in a tunnel completely out of the air stream, is designed for moving corrosive fumes and air at temperatures as high as 550° F. Six sizes, 19" to 41"

REVERSIBLE DUCT FAN

This fan moves air in either direction with equal efficiency and can be supplied with controls for manual or automatic reversal. It is useful in many ventilating applications as well as in cooling and drying processes. Four sizes: 18" to 44".

HARTZELL
PROPELLER FAN CO.

Div. of Castle Hills Corp.

300 Thomas Blvd. • Piqua, Ohio

ENGINEERING OFFICES IN PRINCIPAL CITIES

Upstream (left) and downstream sides of typical bank of 15 Staynew ventilation filters, Model WKE-8, at Stromberg-Carlson Division of General Dynamics Corporation. Stromberg-Carlson has seven such banks at main plant, has ordered 70 more WKE-8 filters for a second plant.

Installs 179 Model WKE-8 Filters

Stromberg-Carlson Strong on Staynew

When Stromberg-Carlson Division of General Dynamics Corporation expanded rapidly in recent years, increased personnel began to occupy quarters that were once deemed adequately ventilated. The influx of the newcomers, plus a disturbing revelation that roof-mounted filters of the viscous-panel type were letting fly ash seep into offices and painting rooms, prompted a change.

Besides, the frequent maintenance of viscous panels, long a sore point, was being increased.

Stromberg-Carlson's prompt decision to install new ventilation systems in several of the more critical areas has had happy results. Eight new systems containing a total of 109 Staynew filters, Model WKE-8, each equipped with 6-ply Feltex medium, have not only given satisfactory performance since installation a year ago, but their maintenance time has been almost nothing.

The former type, viscous-panel filters, had to be serviced, on the average, every other month. After a full year the Staynew WKE-8s had been serviced only once, though twice-a-year servicing is generally normal. Moreover, a viscous-panel filter takes three times as long to service as a Staynew WKE-8, which may be taken care of on the spot.

On the basis of this economy of operation, Stromberg-Carlson recently purchased another 70 WKE-8s for a second plant.

Whatever *your* filter problems, there is a Dollinger representative nearby ready to help solve them. Write for Bulletin 600.

Dollinger Corp., 55 Centre Park
Rochester 3, N.Y.

PROTECTOMOTOR

STAYNEW **DOLLINGER**

FILTERS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

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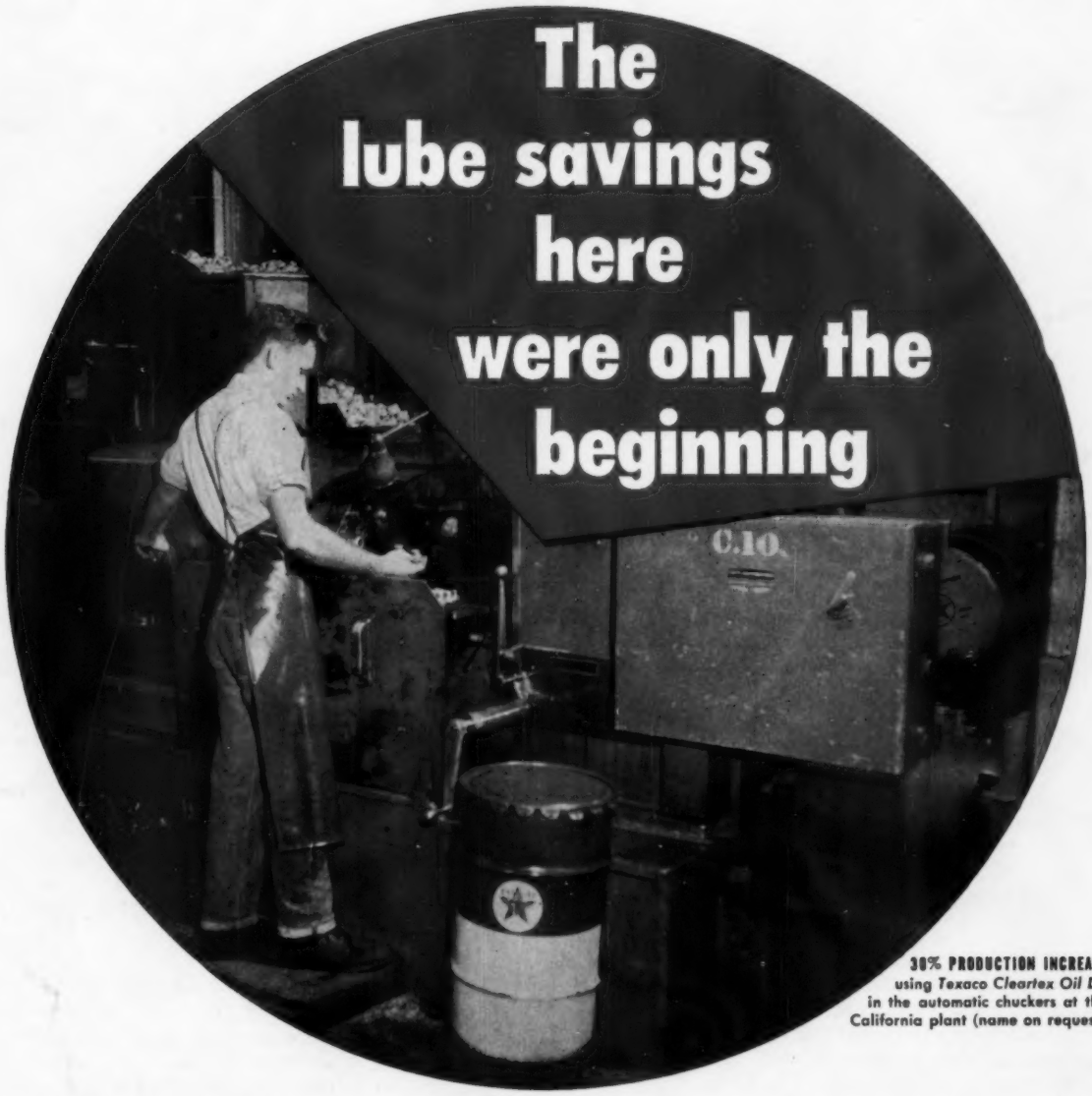
The lube savings here were only the beginning



30% PRODUCTION INCREASE using *Texaco Cleartex Oil DD* in the automatic chuckers at this California plant (name on request).

The lubrication schedule for this unit symbolizes much more than the economical, efficient lubrication of a specific machine. It means a Texaco Lubrication Engineer made a survey of lubrication needs throughout this plant and came up with money-saving recommendations.

First, he reduced inventory. He proved that a few versatile oils and greases could take the place of the wide assortment the plant was stocking. The results of his suggestions have been: improved machine performance, dependable operation and a material saving in maintenance costs. The savings in a number of places added up to an important over-all cost reduction.

Texaco Lubrication Engineers can offer practical suggestions on lubrication in every type operation: manufacturing, construction, mining, transportation—whatever else. This exclusive service is backed by more than 2,000 Texaco Distributing Plants in all 48 States.

For complete information on Texaco products and service, call the Texaco Distributing Plant nearest you or write:

The Texas Company, 135 East 42nd Street, New York 17, New York.

TEXACO

TEXACO Lubricants, Fuels and Lubrication Engineering Service

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The magazine that helps **plant** engineers with their everyday problems

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